

BULLETIN No. 21

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The Philadelphia, Wilmington & Baltimore Railroad



**The Railway and Locomotive
Historical Society**



S. M. FELTON—April 1877—President 1851-1863

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BULLETIN No. 21

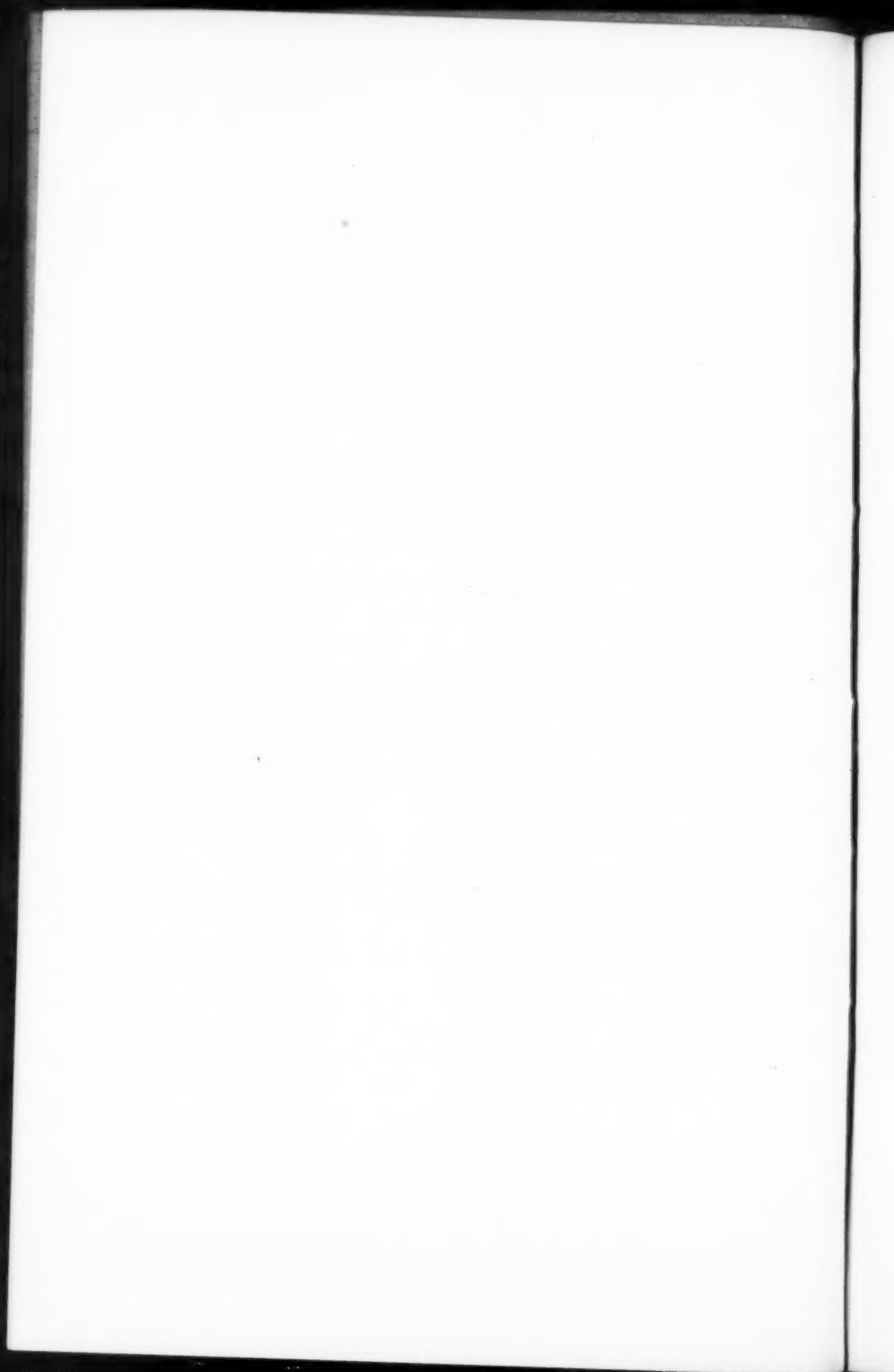
The Philadelphia, Wilmington & Baltimore Railroad

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AGAIN we have prepared for our members the history of another interesting road—The Philadelphia, Wilmington and Baltimore R. R. This road was the scene of the first successful coal burning locomotive. The road performed a wonderful service in getting the troops to Washington at the time of the Civil War. The pages of its reports make an interesting history yet one cannot but be amused at the timidity of the managers in the running of the Night Mail and the connecting ferry at the Susquehanna River. So far as the reports show, the road from the first was of standard gauge and it formed an important link in the transportation of freight and passengers between Philadelphia and Baltimore.

Since the appearance of BULLETIN No. 19, many letters have been received commending the appearance of bulletins covering the history of an individual road and also many suggestions have been made. To those who have requested histories of specific roads to appear, please understand that we can only publish such histories the reports of which are nearly complete in the Baker Library. It is unfortunate that some of the roads presenting the most interesting histories, either do not contain enough data in their reports to make their history worthwhile to publish or either our file of reports is incomplete. We are glad to continue this work however, as long as our members feel an interest in this type of bulletin.

The Philadelphia, Wilmington & Baltimore Railroad Company

By CHAS. E. FISHER.

THIS little road, for it was small measured in size with our modern transportation units, as the name implies, connected Philadelphia and its northern and western connections, with Baltimore and its southern and western connections. It is a road rich in history. It was one of the first roads to carry the United States Mails, played the all-important part in getting President Lincoln in safety to Baltimore and Washington, was the scene of the first successful coal burning engine in this country and has probably carried more ambassadors, diplomats and personages of importance to and from Washington than any other road. The annual reports of this company are of genuine interest to the student of railroad history and for this reason a brief recitation of the facts contained therein may make a welcome addition to the bulletins already published.

Before taking up the history of the Philadelphia, Wilmington & Baltimore R. R., another enterprise in the State of Delaware deserves mention. On February 7th, 1829, the New Castle & Frenchtown R. R. was chartered to build a road between those two places, a distance of 16.19 miles. This small road was part of a link of transportation between Philadelphia and Baltimore. By leaving Philadelphia on a steamboat and sailing down the Delaware River to New Castle, thence to Frenchtown by the railroad and from Frenchtown which is on the Elk River, down Chesapeake Bay to Baltimore. The time consumed by this journey was one day. The road was opened for traffic and at first horses were used. The first engines were built by Robert Stephenson (see BULLETIN No. 6) and they were assembled at New Castle. This gave rise to the establishment of a locomotive building plant in this place (see Bulletin No. 18).

There is however, in connection with this road, one interesting item in regard to signalling which was very ably treated by one of our members, Mr. H. M. Sperry, in a paper read before the Railway Club of Pittsburgh, March, 1926. Poles, thirty or thirty-five feet high were erected about three miles apart. When a train started from either end of the road a white flag was raised to the top of the pole. The flagman at the next station, whose duty it was to look through a nautical telescope every few minutes during the day, hoisted his flag to the top of the pole and so on to the end of the road. After a time it was customary to hoist the flag on the Court House steeple at New Castle, when the train departed at that point, and thus the progress of the train was traced from block to block until the information was received at Frenchtown. If for any reason the engine broke down or the train was delayed because of the boat, a black flag was hoisted. This system of signalling proved so satisfactory that after a time bell-shaped signals consisting of peach baskets

covered with cloth were used in place of the flags. And speaking of signalling, it was one of the early engineers on the Philadelphia, Wilmington & Baltimore R. R., found that by lifting the safety valve and letting the steam escape with a loud hissing noise, he could warn the train crew of danger ahead. Col. W. Milnor Roberts, authorized by the directors of the then building Cumberland Valley R. R. to secure locomotives for that road, visited many of the locomotive shops in an effort to secure the needed engines. Among the places he visited was the New Castle Works and was present later when the engine was tested. He states that he witnessed the "first experiment of applying steam to a trumpet. This was between 1831 and 1833 and that this preceded the introduction of the steam whistle". These however, are interesting side lights of early railroad history. The New Castle & Frenchtown R. R. became a part of the Philadelphia, Wilmington & Baltimore R. R. The amount of time consumed in making the trip between Philadelphia and Baltimore over this route caused the route to be abandoned and part of the tracks were taken up, which will be spoken of later.

On February 5th, 1838, the Philadelphia, Wilmington & Baltimore R. R. of Pennsylvania, the Wilmington & Susquehanna R. R. of Delaware and the Baltimore & Port Deposit R. R. of Maryland were united into one corporation, the Philadelphia, Wilmington & Baltimore Railroad Company. The par value of the stock of the new company was fifty dollars a share, the stockholders of the three old companies receiving a pro rata number of shares in the new company. Fifteen directors were to manage the affairs of the new company, one of which was to be elected President. The annual meetings of the stock holders were to take place in Wilmington on the second Monday of January on each year. The Board of Directors were to meet alternately at Wilmington or Philadelphia, while special meetings could be held in either of the two places or Baltimore. On the 14th of February, 1838, the stock holders of the three companies approved the articles of union and the following men were elected: Matthew Newkirk, President, Jacob J. Cohen, Jr., Vice President, Allan Thompson, Treasurer at Wilmington, Aubrey H. Smith, Assistant Treasurer at Philadelphia, J. Wilson Wallace, Secretary at Philadelphia and Wm. P. Brobson, Assistant Secretary at Wilmington. Messrs. Mathew Newkirk, William D. Lewis, John Connell, John Hemphill and Thomas Smith were Directors from Philadelphia, Messrs. James Price, James Canby, David C. Wilson, James A. Bayard and W. Chandler were Directors from Wilmington; Messrs. Jacob J. Cohen, Jr., Charles F. Mayer, John M'Kim, Jr., James Swan and Wm. A. Patterson were Directors from Baltimore.

At the time of the consolidation the road extended from Baltimore to within three miles of Philadelphia, omnibuses being used to carry the passengers into the latter place. On November 1st, 1838, upon the completion of the draw span across the Schuylkill River, the road was opened for service between Baltimore and Philadelphia. Cars however were drawn across the bridge by horses in order that the structure might not be endangered by fire caused from sparks from the locomotives. Land was purchased in Philadelphia on the south side of Market, near Elev-

enth Street for a passenger station. At Havre de Grace, a steamboat was maintained for carrying the passengers across the Susquehanna River. 146,410 passengers producing a revenue of \$296,796.74 were carried in 1838. During the last six months of the year, a night line was maintained from Baltimore to Philadelphia and cars of a new construction, by which the seats used in day travel may at night be converted into two or three tiers of comfortable sleeping berths, are used on this line. The revenue from merchandise during the year was \$41,204.46. On January, 1838, under a contract with the United States Government, the road received \$27,500.00 for the transportation of mails. The Directors felt that this sum was inadequate on account of the disarrangement of their present system and attendant risk and expense.

1839

On January 26th, 1839, a freshet carried away a portion of the New-kirk viaduct across the Schuylkill River, disrupting the service for a few weeks. Mention is made of the negotiations with the County Commissioners to remove the toll charges from this bridge.

In the report covering the activities of the road during the year two interesting items are mentioned. First the construction of the road: Several kinds of rail were used, a bridge rail weighing 40 lbs. per yard; a T rail weight 56 lbs. per yard and a heavy bar rail $1\frac{3}{4}$ " in thickness by $2\frac{1}{2}$ " in breadth weighing 40 lbs. per yard. Certain portions of the track between Philadelphia and Wilmington had a heavy plate bar. The superstructure consisted of longitudinal sills, connected by cross ties of locust, red cedar or seasoned white oak, and surmounted by longitudinal string pieces of Carolina heart pine on which is laid the iron rail. Upon the greater portion of the road, the strength of the iron bar is such as to render unnecessary the use of the longitudinal string piece, the bar being supported by the cross tie alone.

The bulk of the report however is filled with the Mail service. The contract the road had with the United States Government for the carrying of the mails provided that upon arrival of the southern connection at Baltimore (which was limited to arrive there at $9\frac{1}{2}$ A. M.) and to arrive at Philadelphia at 5 P. M., and to depart from Philadelphia at any time after the arrival of the New York mails (limited to 5 A. M.) and to arrive in Baltimore at $3\frac{1}{2}$ P. M. for which the company received \$27,500.00 per annum. The Postmaster General, knowing that the New York mails arrived in Philadelphia about midnight, wanted them immediately forwarded to Baltimore, instead of leaving Philadelphia at 7 A. M. as formerly and a similar service from Baltimore, so that the road would operate two mail trains in each direction daily. For this extra service the road was offered the extra compensation of \$2500.00. This the Directors declined. Offers and counter proposals were made, but in the end the road lost the mail contract and mails were despatched from Baltimore to York, thence 12 miles by stage to Columbia and then by rail to Philadelphia. In all fairness to the road however, they offered to run the night train from Philadelphia, connecting with the New York mails and to carry mails on each day train, provided the time of departure should

be under the jurisdiction of the Company and they received additional compensation for the hazard and expense. The Government declined to increase the compensation beyond \$300.00 per mile of contracting unless the hours of running the mails were under the jurisdiction of the Department.

In the Report of 1840 appears the first financial statement of the road. The Capital Stock was \$2,250,000.00, Loans (specific) \$1,400,000.00, Bonds due in 1844 \$234,341.00 and Bond to the State of Delaware \$80,793.83. In August, 1839, the road paid their third dividend of 4% and another in February of 1840 of 3½%.

1840

As the result of the controversy between the road and the Post Office Department, a committee was appointed to take the matter up with the Post Master General. As the result, from April 1, 1840 and for one year thereafter, the road was to carry one mail daily in each direction and for intermediate places and from April 1 to Dec. 10th, a second mail daily (Sundays excepted), for which services the road was to receive \$30,600.00 per annum. Although the management felt that the leaving of this train at midnight from Philadelphia was unreasonable and caused a risk to be run which might deter people from using the road, nevertheless the stockholders wished to try the experiment. The freeing of the Market Street bridge from tolls caused the road to take the matter up of freeing the Newkirk Viaduct from tolls.

1841

The report covering the activities of this year deals at no little length with the financial difficulties. In building the road, individual credit was resorted to. There was a considerable amount of stock that was unsubscribed and it was only through the purchase of this stock by two of the stockholders greatly interested in this enterprise that the road was completed. To the Bank of the United States, this company in November, 1840 was indebted upon hypothecation of stock to the amount of \$232,000.00, which was payable between that time and April 18, 1841. As a result, the road issued sterling bonds of the Company, bearing six per cent interest to the amount of £182,500, payable in London ten years hence beginning on November 10, 1840. This covered the pledged stock and obligations to the bank and to individuals.

Mention is first made of the earnings from the New Castle & Frenchtown R. R., amounting to \$141,886.71, which added to the receipts of this company of \$461,981.98, made a total of \$603,868.69. In spite of the financial depression, the road paid a 3% dividend in August.

Nothing further has been done with regard to the carrying of the United States Mail. The old contracts were renewed under protest, but we find during the year that some effort was made to estimate the cost of this service. The following table is given:

Cost of the Necessary Motive Power required to carry or transport
One Mail daily, in one direction, between Philadelphia and Baltimore,
Viz:

2 Locomotives and Tenders, each \$7000.	\$14000.00
1 Locomotive and Tender as a reserve or extra $\frac{1}{2}$ cost	2333.33
2 Mail cars, each \$1100.	2200.00
2 Four horse teams including harness, each \$800. $\frac{1}{2}$ cost	800.00
	<hr/>
	\$19333.33

Estimating that the above Machinery will require re- newal every four years, the annual cost exclu- sive of interest	\$ 4833.33
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Expense of working the above for One Year

1095 Cords of Wood at \$3.00 per cord	\$4380.00
912 $\frac{1}{2}$ gals. of oil at \$1.25 per gal.	1440.63
2 Engineers at \$2.00 per day each	1460.00
2 Firemen at \$1.25 per day each	912.50
1 Conductor at \$1.50 per day	547.50
2 Drivers at \$1.00 per day, each— $\frac{1}{2}$ time	365.00
$\frac{1}{2}$ Feed & Shoeing @ 50c each for 8 horses— $\frac{1}{2}$ time	730.00
1 Extra Hand at Philadelphia at \$1.00 per day	365.00
1 Extra Hand at Gray's Ferry at \$1.00 per day	365.00
1 Extra Hand at Wilmington at \$1.00 per day	365.00
3 Extra Hands to attend Drawbridges at \$1.00 per day	1095.00
3 Extra Hands at Wood and Water Stations at \$1.00 per day (Chester, Elkton and Price's Woods) ..	1095.00
1 $\frac{1}{2}$ Cords Wood extra @ \$3.25 per cord for Steam- boat Susquehanna ..	1582.75
$\frac{1}{2}$ gal. oil extra at \$1.25 per gal. for above	228.12
$\frac{1}{2}$ Cost of Repairs, Wear & Tear of Road & Bridges ..	7500.00
$\frac{1}{4}$ cost of clearing Snow, Ice & other obstructions ...	1000.00
Cost of transporting mails to and from Post Office at Philadelphia and Baltimore	720.00
Wear and Tear and extra labor of S. S. Susquehanna ..	2000.00
	<hr/>
	\$25851.50

Total Expenses incurred by the Philadelphia, Wilming- ton & Baltimore R. R. Co. in transporting the mail in one direction daily from Philadelphia to Baltimore, at hours unconnected with their pas- senger trains, for One Year	\$30684.83
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The above is exclusive of the greatly increased risk of the Compa-
ny's property and jeopardy of life, by running Locomotives and a
Steamboat crossing the Susquehanna during the night.

The above speaks plainer than words how the management felt to-
wards this imposition of carrying the night mail from Philadelphia!

The report covering the year's activities included the reports for the
first time of the two Superintendents, Mr. George G. Craig who had
charge of the road on the Philadelphia end and Mr. Alfred Crawford
who had a similar position on the Baltimore end, the Susquehanna River
being the dividing line.

1842

Because of the inability of the road to liquidate several loans as they
would mature, the stockholders voted on April 14th of this year to exe-

cute a mortgage on May 21st. which would cover these loans and to create a sinking fund to take care of the retirement of these bonds.

During the year, the exact date is not mentioned, the road completed the Depot in Philadelphia, erected on Market, east of Eleventh Street. Previous to this time the passengers were landed in the street.

Mr. J. R. Trimble, Chief Engineer, in his report mentions during this year of the tracks between President St. Depot and Canton St. Depot requiring more attention in view of the fact that engines were now passing over them. This report also makes the first mention of the equipment. Five engines were in service on the Baltimore end of the road and ten on the Philadelphia end. There were shops located at Canton, but none on the Philadelphia end, heavy repairs being done by the New Castle Co. Mr. Trimble mentions the use of a draw spring, attached to the connection between the engine and tender as aiding the tender in steadiness. Of the twenty-two passenger cars owned by the road, four were rebuilt during the year at Canton and four at Messrs. Betts, Harlan & Hollingsworth at Wilmington.

The report is signed by M. Brooke Buckley as President who has succeeded Matthew Newkirk.

1843

Mention is made in the report covering the activities of this year, of the amount of the funded debt—\$2,972,887.16. Of this amount \$80,793.83, being the bond due to the State of Delaware, matured during the year.

During the year new shops were built at Wilmington and the report mentions a locomotive being fitted up at this point for "economizing fuel, consuming smoke and arresting sparks and cinders". "The apparatus has been in partial service for a month and promises to be a success." Possibly this was the type introduced by Mr. Young as mentioned in Bulletin 18.

1844

This year the company added to its equipment the following cars: three passenger cars, six freight cars, nine platform cars, one baggage car and one United States Mail car; two new passenger cars were built to replace old ones unfit for further service. At Wilmington, a spacious house for sheltering the cars has been built, thus protecting them from the weather and reducing the cost of ordinary repairs and painting.

One new locomotive was purchased from the New Castle Co. and three old ones have been rebuilt. The Company now has a force of engines and cars capable of conveying two passenger trains each way daily and transporting one hundred tons of freight in each direction daily.

The laying of T rails between Philadelphia and Wilmington has begun. During the year the running time was reduced from seven to six hours and with the completion of this rail a further reduction of running time is looked for. In some of the worst cuts, the track had been laid upon gravel ballast to provide good drainage.

New bridges over the various creeks and inlets have been built, the truss frames on the plan of "Howe's patent" are mentioned.

1845

With regard to the laying of the T rail between Philadelphia and Wilmington, Mr. Trimble, Chief Engineer makes an interesting statement in his report. He states that the cost of this T rail, 62 pounds per yard, can be purchased in America for \$73.00 per ton. He estimates the sales value of the flat-bar rail that was being removed from the track at \$80.00 per ton.

One new engine was purchased from Messrs. Norris and Messrs. Betts, Harlan & Hollingsworth rebuilt one during the year. No mention is made of the names of these machines.

1846

One new engine was purchased during the year from the New Castle Co. for passenger service. The saving on fuel amounts to 20% over the old engines of this class. Two old engines have been rebuilt and "set" on four drivers instead of two. The report mentions eighteen engines owned by the Company, nine are either new or not over eighteen months old.

The steamboat "Susquehanna" was rebuilt and lengthened.

"Could the stops of mail trains for 'way' passengers be eliminated, the trips from city to city could be made in five hours, even including the 1¼ hour lost by crossing the Susquehanna, and the horse trips at both ends of the Road".

The report of this year gives us the first list of equipment owned by the road:

Passenger cars, 15 old, 6 rebuilt, 7 new	28
Baggage cars, 3 old, 3 new	6
Mail cars, 2 old	2
Pleasure cars	8
Freight cars, 23 old, 11 rebuilt, 15 new	49
Rack cars, 2 old, 1 rebuilt, 8 new	11
Platform cars, 12 old (four wheels), 17 new (eight wheels)	29
Horse cars (four wheels)	3
Box cars (four wheels), 16 old, 8 new	24
Road cars (four wheels) 16 old, 2 new	18
Total	178

Engines, 6 old, 4 rebuilt (2 drivers), 5 rebuilt (4 drivers) 3 new (6 new tenders) ..	Total	18
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Those marked new and rebuilt have been on the road since 1844.

Mr. E. C. Dale has succeeded Mr. Buckley as President and Mr. J. I. Cohen, Jr. is mentioned as Vice President.

1847

No. of Miles Operated	98*	No. of Locomotives	20
Philadelphia to Baltimore.		No. of Cars	207

The mileage given in the above does not include the New Castle line of 16½ miles.

On the 30th of April, as the result of an understanding between the stockholders and loanholders, the following terms were agreed upon:

1. The stockholders agreed to subscribe for new stock, at par, in amount sufficient to pay off the floating debt.

2. The holders of the second mortgage bonds agreed to convert their bonds into stock at par: and

3. The first mortgage loan holders agreed to consolidate their loans, under the security of a new mortgage, to be payable in 1860.

The following is a statement of the liabilities of this company on Dec. 31, 1846:

Loan due June 1, 1855	\$ 700,000.00
Loan due Oct. 1, 1855, £113000	502,222.22
Loan due Apr. 1, 1856, State of Delaware	80,793.83
Loan due Feb. 1, 1858, (exclusive of \$76340 issued as collateral)	802,420.00
Secured by first mortgage of May 21, 1842	\$2,085,436.05
Loan due Nov. 1, 1860, £182500, secured by the second mortgage of May 26, 1842	811,111.11
Total.....	\$2,896,547.16
Arrears of interest and floating debt, less cash and assets	311,803.61
Total.....	\$3,208,350.77
Difference in rate on sterling bonds \$4.44 per pound sterling and specie par \$4.80	105,066.67
Real debt, embraced by the agreement	\$3,313,417.44

By the conditions as outlined above, the above amount has been reduced by a corresponding increase in capital stock, to the sum of \$2,161,776.05, as one loan, convertible into stock at par at the option of the holders, payable on July 1, 1860, with interest at six per-cent, payable semi-annually. This plan relieved the company of the payment of about \$70,000.00 of annual interest and placed the company in a far better financial position.

On Dec. 22, 1847, the bridge across the Schuylkill River at Gray's Ferry, was thrown open to travel, free of toll. The superintendence remains with the company and all rights to use it for railroad purposes are retained. The Company is bound to maintain a roadway across the bridge, free of toll.

Work of laying the T rail continues and Mr. Trimble in his report states that in the reconstruction of the road, there will be no inclination over 15 feet to the mile on the road between Philadelphia and Wilmington save one, near Gray's Ferry. During the year new rail was laid on the New Castle & Frenchtown R. R. which appears in the expenses of this company.

One new engine of the largest class was purchased for passenger service from the New Castle Co. The performance of these engines is very satisfactory and the consumption of fuel much less than the smaller engines.

A new engine house at Wilmington, with iron roof of one span 122 feet in diameter has just been covered in, and the interior an arrange-

ment for tracks, turntable, etc. will be completed as rapidly as possible. It is expected to stow 18 engines of the largest class.

The time of the mail trains from depot to depot has been lessened to 5½ hours.

1843

No. of miles operated98*	No. of Locomotives 22
Philadelphia to Baltimore.	No. of cars241

Mr. J. R. Trimble, Chief Engineer, reports that during the year a three cylinder engine was nearly completed. The engine was placed on the road in January (1849). Two others, rebuilding, are designed for similar service. In addition to the engines required for daily service, four others, in the best of condition, stand ready in the houses to take the place of any locomotive that may become deranged, and thus permit its immediate repair.

1849

No. of miles operated98*	No. of Locomotives 23
Philadelphia to Baltimore.	No. of cars252

During the winter, the Susquehanna River was frozen in January and remained so for six weeks, an event said to have been without parallel since the year 1800. This caused the road to use the Chesapeake Bay line for some travel and coming shortly before the inauguration, probably caused many people to deter their visit to Washington.

In March of this year cholera made its appearance in the south and west which caused additional loss of passenger revenue.

During the year a passenger station was built at President Street, Baltimore. Prior to this the road had used the Pratt Street Station of the Baltimore & Ohio R. R. and had paid for that part of the track which lies between President and Pratt Streets. The location of the President Street Station permitted the road to handle their trains to it by means of locomotives and eliminated the use of horses to the Pratt Street Station.

During the year, an arrangement was made with this company and others in the issuing of a through ticket at a reduced rate from New York to Charleston, S. C. and an emigrant ticket from New York to Pittsburgh.

During the winter, as the result of an agreement with the Post Office Department, the road agreed to carry the night mail from Philadelphia to Baltimore. The previous agreement did not include this service during the four winter months.

Mr. E. C. Dale has been succeeded by Mr. W. H. Swift, also of Philadelphia, as President.

Mr. Trimble, the Chief Engineer, presents for the year a very interesting report. At the outset he suggests the need of uniform reports in order to make a comparison between roads. In his own case he has followed the form prescribed by the State of Massachusetts, and while it may not perhaps be the best that can be drawn up, the use of it by a few roads would cause others to follow. He also suggests a "renewal fund" so that renewals will not come out of current receipts for one year but spread over several.

In the matter of rails, he presents interesting information. The road at this time was using four different types of rails. Between Philadelphia and Gray's Ferry and from Wilmington to Susquehanna a bridge or (inverted U) rail weighing 40 lbs. to the yard was used. This rail exhibited more defects and more rails removed in proportion to its length of track than all the others. It is stamped E. V. and made in 1836 at the best manufacturer's mill in Wales. From Havre de Grace to Baltimore a square bar rail, 40 lbs. to the yard, laid on a continuous bearing of wood was used. This has done better than the previous rail but it has not been satisfactory. Between Gray's Ferry and Wilmington T rails of 55 and 62 lbs. per the yard were used. The 62 lbs. rail had been in service four years and not one length had been removed. The other rail had also given good service. Mr. Trimble's conclusion is that durability depends more on the form rather than fidelity of manufacture.

With regard to locomotives, Mr. Trimble states it has been the practice that when an old locomotive has worn out, to rebuild it, using as many of the old parts as possible and thus make it as modern in every way as possible. The rule being—"to improve within moderate bounds." In making mention of the three cylinder engines, he states the middle cylinder is simply an addition acting as auxiliary to others, giving more power and more steadiness of motion.

For the first time a list of the locomotives on this road appears, as follows:

Name	Builders	Wt. of Engine	Wt. on Drivers	Diam. of Drivers	Cylinders	Remarks
Baltimore	P. W. & B.	38000		63"	13x24"	In Good Order
Boston	New Castle	40600	24500	60"	14 $\frac{1}{4}$ x20"	"
Brandywine	Baldwin	35000		63"	12 $\frac{1}{2}$ x21"	In Shop for cut off
Brantz	Norris	32000		50"	10 $\frac{1}{2}$ x18"	In Good Order
Canton	P. W. & B.	45000		63"	12 $\frac{1}{2}$ x21"	"
Christiana	Huston	49150	31420	72"	12x26"	"
Gunpowder	Norris	28000				"
Harrison	Baldwin	42000	26100	63"	14 $\frac{3}{8}$ x20"	"
Hercules	New Castle					Rebuilding
Kentucky	Norris	31000	18010	48"	10 $\frac{1}{2}$ x18"	In Shop for repairs
Lafayette	Norris					Old, wants new firebox
Minerva	New Castle	41950	25330	66"	15x20"	In Good Order
Mississippi	New Castle	41200	25040	60"	14 $\frac{3}{8}$ x20"	"
Orion	New Castle	40790	24900	56"	13x20"	"
Ohio	Norris					Rebuilding
President	P. B. & W.	44370	28200	63"	14x21"	In Good Order
Rough & Ready	Baldwin	36490		50"	12x18"	"
Schuykill	Norris	32000	18740	50"	10 $\frac{5}{8}$ x20"	"
Susquehanna	Norris	20000		50"	10 $\frac{1}{2}$ x18"	Old
Victory	New Castle	38830	22820	60"	14 $\frac{1}{4}$ x20"	In Good Order
Washington	Norris	49170	29000	63"	"	Under Repairs
John Bull	English			54"	11x18"	"
Maryland	New Castle	20000		56"	10 $\frac{1}{2}$ x16"	"

*Three cylinder engine—

outside cylinders 10 $\frac{1}{2}$ x19"—inside 15x20"

Unfortunately the construction dates are not given and they do not appear for some little time. With regard to the engines built by the company, it is safe to assume that they were old engines, rebuilt. The "John Bull" is something of a mystery as the engine does not appear after 1852. The only known English built engine was the "Wilmington", built by Edward Bury in 1835. Possibly this is the same engine—dubbed "John Bull" and appears as such in the report.

1850

No. of Miles Operated98*	No. of Locomotives23
Philadelphia to Baltimore.	No. of Cars276

On February 18, 1850, the new passenger station at President Street, Baltimore, was finished and occupied, since which time horses in Baltimore have been dispensed with.

On Dec. 2nd, 1850, an express train between Philadelphia and Baltimore, connecting with the morning express trains from New York and Washington was put on, making the run between the two cities in four and one half hours. The train left Philadelphia at 3.00 P. M. and left Baltimore at 11.15 A. M.

1851

No. of Miles Operated98*	No. of Locomotives25
Philadelphia to Baltimore.	No. of Cars308

The report covering the activities of the company for this year is signed by Mr. S. M. Felton, as President.

The express train mentioned in the previous report was tried for only the four winter months. The connections were imperfect and although it gave great public satisfaction it did not meet fully the requirements. It is now intended that the train will run the entire year on the following schedule: Leave Philadelphia at 2 00 P. M. making connection with the 9 00 A. M. train from New York, arrive at Baltimore at 6 30 P. M., making connection with the 7 30 P. M. train from Baltimore, arriving at Washington at 9 00 P. M., making the total running time from New York to Washington in twelve hours. Northward it leaves Baltimore at 11 00 A. M. connecting with the 8 30 A. M. train from Washington, arrives at Philadelphia at 3 30 P. M. connecting with the 4 00 or 5 00 P. M. train for New York arriving at either 8 30 or 9 30 P. M.

As the result of new steamship lines from New York and Philadelphia for southern ports, the road suffered a decrease in the number of passengers as did the New Castle Line. The delays at Philadelphia and the Susquehanna River were being felt, delays which had been called to the attention of the Directors by Mr. Trimble, the Chief Engineer. The track needed further improvements and 3000 tons of rails, 60 lbs. per yard were purchased.

1852

No. of Miles Operated98*	No. of Locomotives29
Philadelphia to Baltimore.	No. of Cars301

The express train operating between Baltimore and Philadelphia was changed so as to leave Baltimore at 8 30 A. M., connecting with the 6 00 A. M. train from Washington, arriving at Philadelphia at 12 30 P. M., giving the passengers ample time for lunch and connect with the 2 00 P. M. train for New York. The running time in each direction was reduced to four hours.

On May 17th, 1852, the new station in Philadelphia at Broad and Prime Streets was opened. The building was 400 feet long and 150 feet in width, and contained the necessary waiting rooms. On the second floor was a large hall, the largest in that section of the city and four offices of the Company. The train shed housed eight trains. Trains were brought to this station by locomotives and trains drawn by horses over tracks that the company had no jurisdiction, were a thing of the past. The cost of the station was \$65,000.00.

The expected completion of the Baltimore & Ohio R. R., caused the company to investigate further into the possibility of bridging the Susquehanna River and three reports in its favor, from the company's own committee, the U. S. topographical engineer and the State legislature were made. A new ferry steamer was ordered during the year.

The New Castle line showed a severe decrease in passenger revenue. This was caused by the opening of the New York & Erie and the Pennsylvania Railroads which diverted the western passenger business to their roads. Also, outside steamship lines from New York to Charleston and Savannah took some of the southern business. With the completion of the Baltimore & Ohio, the Wilmington & Manchester roads, the road hopes to regain some of this lost western and southern business. Perhaps most of the loss might be accounted for in the fact that the P. W. & B. reduced the fare between Philadelphia and Baltimore and this, added to the slowness of the old New Castle Line was the beginning of the end of that line.

Mr. Trimble, Chief Engineer, states that the road is now completely laid with the T rail, forty-three miles being laid during the year. The cost was about \$7200.00 per mile, including material and labor.

1853

No. of Miles Operated105*	No. of Locomotives32
Philadelphia to Baltimore and	No. of Cars?
New Castle.	

During the year, the New Castle & Wilmington R. R. was completed. This road was leased to and operated by the P. W. & B. R. R. The latter agreed to an annual rental of 7% per annum. The capital stock was increased \$150,000.00 for the purchase of new cars and locomotives. The road cost about \$90,000.00. With the completion of this road, through

trains were run from Philadelphia to New Castle and the steamboats between those two places were discontinued.

Mr. Isaac R. Trimble is no longer the Chief Engineer and his office is now filled by Mr. S. L. Spafford, General Superintendent. In 1855, Mr. Spafford contracted a fever and died, but during his short term of office on the road he made some improvements which cannot be passed unnoted. He had printed and displayed at all stations the freight and passenger tariffs of the road. The agents at all freight stations were required to manifest all articles of freight and all cars leaving the stations. The agent must submit a detailed statement showing the daily transactions of his department.

Mr. Spafford appointed Mr. A. W. Foster as Master of Transportation. Mr. Joseph Teas, is Superintendent of Machinery at Wilmington.

1854

No. of Miles Operated105*	No. of Locomotives38
Philadelphia to Baltimore and New Castle.	No. of Cars ?

During the year what was known as the Southwark R. R. was completed. This allowed the road to run to the Delaware River where it connected with the ferries of the Camden & Amboy R. R. and saved the passengers enroute to or from New York the trip in an omnibus through the streets of Philadelphia.

Progress has been made in taking soundings for the bridge across the Susquehanna. Work of building the Port Deposit Branch, the Delaware R. R. and of double-tracking the road has been well under way.

1855

No. of Miles Operated105*	No. of Locomotives33
Philadelphia to Baltimore and New Castle.	No. of Cars402

During the year, thirty five miles of the Delaware R. R. were laid and on Sept. 1, the road was opened to Middletown. This road, leased by the P. W. & B. R. R., was to be built from some town on the New Castle & Frenchtown R. R. to Dover, Del., thus opening up the central portion of the State of Delaware and giving them means of transportation.

The new transfer steamer "Maryland" was placed in service on the Susquehanna River during the year. This steamer had a capacity of 21 cars, whereas the "Susquehanna", the former steamer could carry only five.

Mr. Geo. A. Parker has succeeded Mr. Spafford as General Superintendent and in his report he mentions the altering of a locomotive to burn coal.

To his report is also attached a list of locomotives showing their construction dates which will doubtless be of interest to our members. Another such list does not appear for several years.

**Locomotives Owned by the Philadelphia, Wilmington & Baltimore R. R.
November 30th, 1855**

Name	Builders	Date	Cylinders	Dia. of Drivers	Wt. of Engine	Remarks
America	New Castle	1854	17x22"	66"	51100	
Baltimore	P. W. & B.		13x24"	54"	38000	
Boston	New Castle	1848	14 1/2 x20"	60"	40600	
Brandywine	Baldwin	1848	12 1/2 x20"	56"	38760	Rebuilt PW & B
Brantz	Norris		10 1/2 x18"	50"	32000	Rebuilt PW & B
Canton	P. W. & B.		12x26"	72"	45000	
Christiana	Baldwin	1837	"	"	49150	Rebuilt Elliott & Huston.
Cincinnati	New Castle	1853	15x20"	66"	44400	
Constitution	"	1854	17x22"	"	51970	
Delaware	"	1853	15x20"	"	42070	
Empire	P. W. & B.	1851	14x26"	72"	46000	
Gunpowder	"	1853	12 1/2 x18"	50"	28000	
Goliath	New Castle	1853	17x22"	"	49820	Rebuilt PW & B
Harrison	Baldwin		14 1/2 x20"	60"	42000	Rebuilt Betts, & Hollinsworth
Lafayette	Norris		10 1/2 x18"	50"	28000	Rebuilt PW & B
Magnolia	P. W. & B.	1854	18x22"	68"	49600	
Maryland	New Castle		15x20"	60"	41820	
Meteor	"	1854	17x22"	66"	51660	
Minerva	"	1849	15x20"	"	43170	Rebuilt PW & B
Mississippi	"	1848	14 1/2 x20"	60"	41200	Rebuilt PW & B
C. W. Morris, Jr.	"	1854	17x22"	66"	51590	Rebuilt PW & B
New Castle	"		13x20"	60"	40790	Rebuilt PW & B
Ohio	Norris	1846	"	72"	55120	
Orion	New Castle	1846	13x20"	56"	40790	
Pennsylvania	"	1853	15x20"	66"	41660	
Samson	"	1853	17x22"	50"	49790	
Susquehanna	Norris		10x18"	56"	26380	
United States	New Castle	1851	15x20"	60"	43550	Rebuilt PW & B
Union	"	1851	"	"	43515	
Victory	"	1847	14 1/2 x20"	"	38830	
Virginia	"	1854	15x20"	"	45000	
Washington	Norris		"	63"	48170	Rebuilt PW & B
Wilmington	New Castle	1852	15x20"	66"	40220	

*Three Cylinder engine 12 1/2 & 15x19"

**Three Cylinder engine 10 1/2 & 15x19"

The "New Castle" in the above list should not be confused with an engine of the same name on the New Castle & Frenchtown R. R., built by New Castle Mfg. Co. 1838, 10x18" 56" 26380. In a report of that road, submitted Jan. 10, 1850, they mention the engines "Delaware" and "Virginia", 10 and 9 tons respectively, both built at New Castle and both new in 1847. These last two should not be confused with engines of the same name on the P. W. & B. R. R.

1856

No. of Miles Operated 105*	No. of Locomotives ?
Philadelphia to Baltimore &	No. of Cars ?
New Castle.	

With the new rail on the Main Line and consequent improvement in service, the New Castle line received but little business. Earnings during the year were not equal to expenses. The steamboats, formerly in service between Philadelphia and New Castle had been run to Cape May,

but even this service did not pay. The opening of the Delaware R. R. to Seaford, did help make up the loss of revenue on the New Castle route. The opening date of the Delaware R. R. to Seaford is not given. This road opened up a territory rich in the production of fruits, early vegetables and white oak.

Included in this report is a report submitted by Mr. J. E. Larkin, Chief Engineer. This report covers in detail all the property owned by the P. W. & B. R. R. with a description of same.

1857

No. of Miles Operated105*	No. of Locomotives	?
Philadelphia to Baltimore &	No. of Cars	?
New Castle.		

In the report covering the activities of the year 1857 we find some very interesting items.

The New Castle road, which has continued to run at a loss of about \$50,000.00 a year for the last two years is abandoned. That portion of the road between Delaware Jet., (with the Delaware R. R.) and Frenchtown and the steamboats between the latter place and Baltimore were abandoned and sold.

In September of this year, the Principio improvement was completed. This called for a total outlay of \$105,481.01 and called for a stone arch over the creek with new alignment.

A new system of tickets was inaugurated during the year. This provided for the names of the stations being printed on the ticket between which places it would be accepted for transportation. The tickets were numbered and are punched by the Conductor after leaving each principal station. As they are good for the date only on which they are issued, the Agent is responsible for all from the lowest to the highest numbers collected. The Agent's accounts are examined once a month. In order to discourage the payment of cash fares on the train, ten per cent additional is charged, thus the fare from Baltimore to Philadelphia being \$3.00, if purchased on the train would cost the passenger \$3.30. In this connection much is said of the Free Pass evil. This road suffered no little loss of revenue in passing officials free from other roads. This road being a connecting link in the line to Washington was at a disadvantage inasmuch as it received requests for transportation from other roads while the officials of the P. W. & B. seldom had occasion to use the roads making the request.

The contract system has been in use for one year and with good results. This included the running of all trains at a stipulated price per mile, including repairs and renewals of locomotives, fuel, oil and waste, and wages of engineers and firemen. Labor for repairs on the road was furnished by contract. Freight business is paid for by the ton, including wages of conductors and brakemen. Fuel is furnished at a stipulated price for the year. In 1857, all work performed on this road was under

the contract system, excepting repairs of bridges, that of the Treasury Department and the Conductors and supervising officers.

During the year the coal burning passenger locomotive—"Daniel Webster", built by the Taunton Locomotive Works was put into service. This engine ran the Night Express train between Philadelphia and the Susquehanna River, making from April 14th to Nov. 30th, 22,609 miles at a cost of 6.96c per mile for fuel. This showed a great improvement over the "Christiana", formerly a wood burner but altered to burn coal.

To the success of this Coal burning engine, credit is due to Mr. S. M. Felton, the President of the road. In 1849, when on the Fitchburg R. R., Mr. Felton knew, that with our rapidly diminishing wood supply, that some other fuel must be used. Accordingly an engine was fitted up to burn coal and with a good deal of nursing this engine now and then made a trip. While not a success as a coal burning engine it formed a scarecrow to the wood contractors and caused them to keep the price of wood at 50c a cord.

In 1855 an experimental coal burning engine was built on the Dimpfel system, by Mr. Fairbanks of the Taunton Locomotive Works, Messrs. Felton and Fairbanks being the owners. The engine was tried on the Boston & Worcester and the Western (Mass.) Railroads. On the second trip, being attached to a train carrying a load of Kansas emigrants, after about thirty miles the engine began to slow down and finally "died". After sending the Kansas emigrants on their way behind another engine, an examination showed that the damper which had been imperfectly secured in the open position had jarred shut, which had caused the fire to go out. Although the engine made other successful trips, it was condemned as a failure and was finally sold at a loss of \$8000.00 to Messrs. Felton and Fairbanks.

The "Daniel Webster", built on the Dimpfel plan, was a success from the start and never made a failure. Under the direction of Mr. William Stearns, Master Mechanic and Mr. N. Goohin, Engineer, this engine took her place as the most successful coal burning engine in the country.

1858

Miles of Road Operated ...105	No. of Locomotives	?
Philadelphia to Baltimore &	No. of Cars	?
New Castle.		

The Stockholders voted to float a new loan, not exceeding \$2,600,000.00 to provide means of payment of the loan due July 1, 1860 and for two improvement loans.

Under the item "New Iron and New Work" an interesting chapter is written regarding the early rails. "There is no question that the rails manufactured in England, in the early days of the Railroads, were the best that have ever been laid down; but as the demand on this side increased, and the price diminished by strong competition, the English iron rapidly degenerated, until finally many lots were sent here that were not worth laying down." A lot of this iron, purchased in 1854 from

Losh, Wilson and Bell of New Castle lasted only 4.1 years and proved to be the poorest on the road. 4500 tons of iron purchased from Bailey, Bros. & Co. (England) lasted 11.58 years, but the best iron appeared to be furnished by the Montour Iron Co., (U. S.) which lasted 12.65 years.

Coal burning is still being carried on in locomotives, and a new locomotive, the "Henry Clay" has been received from the Taunton Works.

1859

Miles of Road Operated105	No. of Locomotives?
Philadelphia to Baltimore & New Castle.	No. of Cars?

The Delaware R. R., operated by lease to this Company and not included in the mileage of the above has been extended to the State Line—Delmar, and from there, a road will be built by a Maryland company to Crisfield.

Two long passenger cars were fitted up into sleeping cars and attached to the Night Express and used between Philadelphia and Washington so that "the passengers may have a comfortable night's sleep and not be disturbed by any change of cars at the Susquehanna.

The engine "Morris", first engine fitted up with the firebrick arch on the plan devised by Mr. Bullock, M. M. of the Old Colony R. R. has proved to be a success. The engine burned wood.

1860

Miles of Road Operated105	No. of Locomotives?
Philadelphia to Baltimore & New Castle.	No. of Cars?

In this report we find an interesting statement affording a comparison of the coal burning and wood burning locomotives.

"Daniel Webster"—Express Passenger Engine—mileage 35265.
 Cost of Fuel per mile—4.94¢ (Coal Burner)
 Cost of Repairs per mile—3.7¢
 Total mileage since Apr. 14, 1857,—122,645.

"George Washington"—Passenger Engine—mileage 36936.
 Cost of Fuel per mile—4.84¢ (Coal Burner)
 Cost of Repairs per mile—2.1¢

"Henry Clay"—Freight Engine—mileage 24444.
 Cost of Fuel per mile—6.12¢ (Coal Burner)
 Cost of Repairs per mile—3.4¢

"William Sturgiss"—Passenger Engine—mileage 4905.
 Cost of Fuel per mile—6.43¢ (Coal Burner recently received)
 Cost of Repairs per mile—1.8¢

"John E. Thayer"—Freight Engine—mileage 25215.
 Cost of Fuel per mile—6.13¢ (Coal Burner)
 Cost of Repairs per mile—1.5¢

"Christiana"—Accommodation Passenger—mileage 13922.
Cost of Fuel per mile—6.56¢ (Coal Burner converted)
Cost of Repairs per mile—7.9¢

"Samson"—Freight Engine—mileage 22949.
Cost of Fuel per mile—6.22¢ (Coal Burner)
Cost of Repairs per mile—4.1¢

"C. W. Morris"—Passenger Engine—mileage 24005.
Cost of Fuel per mile—5.86¢ (Coal Burner converted)
Cost of repairs per mile—4.5¢

"America"—Passenger Engine—mileage 15745.
Cost of Fuel per mile—11.32¢ (Wood Burner)
Cost of Repairs per mile—5.2¢

"Constitution"—Passenger Engine—mileage 15649.
Cost of Fuel per mile—12.60¢ (Wood Burner)
Cost of Repairs per mile 8.9¢

"Cincinnati"—Passenger Engine—mileage 26730
Cost of Fuel per mile—10.22¢ (Wood Burner)
Cost of Repairs per mile—5.9¢

"Pennsylvania"—Passenger Engine—mileage 27551
Cost of Fuel per mile—12.59¢ (Wood Burner)
Cost of Repairs per mile—3.9¢

"Goliath"—Freight Engine—mileage 11847
Cost of Fuel per mile—15.39¢ (Wood Burner)
Cost of Repairs per mile—7.5¢

"Empire"—Freight Engine—mileage 20378
Cost of Fuel per mile—17.26¢ (Wood Burner)
Cost of Repairs per mile—3.8¢

"Magnolia"—Freight Engine—mileage 20041
Cost of Fuel per mile—18.46¢ (Wood Burner)
Cost of Repairs per mile—4.7¢

"Maryland"—Passenger and Freight Engine—mileage 11770
Cost of Fuel per mile—16.08¢ (Wood Burner)
Cost of Repairs per mile—3.5¢

"Virginia"—Passenger and Freight Engine—mileage 16961
Cost of Fuel per mile—13.28¢ (Wood Burner)
Cost of Repairs per mile—7.6¢

The opening of the Orange & Alexandria to Lynchburg, the completion of the Mississippi Central and the road from Charleston to Savannah, with the exception of the ferry at Susquehanna and Washington, a continuous route now exists between Philadelphia and New Orleans.

1861

Miles of Road Operated . . . 105	No. of Locomotives 32
Philadelphia to Baltimore &	No. of Cars 674
New Castle.	

Upon the outbreak of the war, the road suffered no little loss of property. On April 20th, the day after the Sixth Massachusetts Regi-

ment was fired upon by the mob in Baltimore, I. R. Trimble, former Chief Engineer of this road, burned three bridges between Baltimore and the Susquehanna River and put this part of the road out of commission until May 14th. Mr. Trimble stated he acted under orders of the City of Baltimore and the State of Maryland. The road continued to forward troops to Washington, carrying them to Perryville and then on to Annapolis via the Steamer "Maryland", with such despatch as to save the City of Washington. For this promptness the road earned the gratitude of our Government.

Troop movements caused the road to increase their facilities at the river, at the same time the Steamer "Maryland" carried all the troops and freight without change of cars and did not fail in its performance.

The delay in troop movements by some of the connecting roads caused much to be said in Washington of an Air Line to be built by the Government between Washington and New York. From April 18th to Nov. 30th, this road carried 154,303 troops.

With the Baltimore & Ohio R. R. having its difficulties with the Rebellion and the southern roads cut off, but little through business was done during the year.

In this report we find a list of locomotives worthy of reproduction. Note the two three cylinder engines "Ohio" and "Washington" do not appear and of their disposition no mention is made in the reports. Note also this road was furnishing locomotives to the leased roads, but the terms other than the Delaware R. R. we do not know.

Locomotives on the P. W. & B. R. R.—Oct. 31, 1861

Name	Builder	Date	Cylinders	Dia. of Drivers	Wt. of Engine
America	New Castle	1854	17x22"	66"	51000
Edward Austin	Baldwin	1861	14x24"	66"	53000
Baltimore	P W & B		13x24"	63"	38000
Brandywine	Baldwin	1848	12 ½x20"	56"	38760
Christiana	"	1837	12x26"	72"	49150
Cincinnati	New Castle	1853	15x20"	66"	41400
Constitution	"	1854	17x22"	66"	51970
Henry Clay	Taunton	1858	16x24"	64"	63850
Empire	P W & B	1851	14x26"	72"	46000
J. M. Forbes	Baldwin	1861	15x24"	66"	57000
Gun Powder	P W & B	1853	12 ½x18"	50"	28000
Goliath	New Castle	1853	17x22"	50"	49820
Magnolia	P W & B	1854	18x22"	68"	49600
Maryland	New Castle	1853	15x20"	60"	41820
Mississippi	"	1848	14 ½x20"	60"	41200
C. W. Morris, Jr.	"	1854	17x22"	66"	51590
Pennsylvania	"	1853	15x20"	66"	41660
Samson	"	1853	17x22"	50"	49790
William Sturgis	Taunton	1860	16x22"	66"	57550
John E. Thayer	Baldwin	1859	16x24"	60"	63175
Virginia	New Castle	1854	15x20"	66"	45000
Wilmington	"	1852	"	66"	40220
Geo. Washington	Baldwin	1859	15x22"	66"	56675
Daniel Webster	Taunton	1858	16x22"	66"	58175

Locomotives Owned by the P. W. & B. R. R. Used on the New Castle & Wilmington, New Castle & Frenchtown, Delaware, Eastern Shore and Junction and Breakwater Railroads.

Victory	New Castle	1847	14 $\frac{3}{4}$ x20"	60"	40150
Boston	"	1848	14 $\frac{3}{4}$ x20"	60"	41800
Delaware	"	1851	15 $\frac{1}{4}$ x20"	66"	42070
Philadelphia	"	1852	13x20"	66"	39250
New Castle	"	1852	13x20"	60"	39350
William Penn	"	1855	17x22"	66"	51500
Thomas Clayton	"	1857	13x20"	60"	39500
Princess Ann	"	1858	15x20"	66"	43500

1862

Miles of Road Operated105	No. of Locomotives37
Philadelphia to Baltimore & New Castle.	No. of Cars801

During the year some attempt to furnish through car service to New York has been tried. The cars of one train a day have been carried by ferry to the Philadelphia & Trenton R. R. Station in Kensington. This service was found tedious and the boat was not adapted for this service. Accordingly the Junction Railroad, constructed jointly by the Pennsylvania, Philadelphia & Reading and this road, on the west bank of the Schuylkill River, was built to furnish this through service.

"Coal burning in locomotives is no longer an experiment, but a well established fact and a decided economy".

The uncertainty of prices of material such as coal, oil, wood, lumber, iron, etc. has caused the road to abandon the contract system for the coming year.

The increase in both the freight and passenger business has rendered imperative the construction of a bridge across the Susquehanna River. As a means in order to determine the action of ice upon it, a pier was sunk, which if it stands the action of the ice and river will cause the work to be commenced the following spring.

1863

Miles of Road Operated105	No. of Locomotives 40
Philadelphia to Baltimore & New Castle.	No. of Cars1001

The pier mentioned in the previous report for the Susquehanna River bridge withstood the winter conditions and under the direction of Mr. George A. Parker, the Engineer of the P. W. & B. R. R., Mr. Benj. H. Latrobe, Consulting Engineer, work on the bridge commences. The great pier, sunk in forty-two feet of water, of solid masonry encased in boiler iron, was completed on November 15th, 1862. This pier was the key to the whole work.

The road is now double tracked from Philadelphia to Darby Bridge, ten miles and from Chester Bridge to Newport, making a total of twenty-seven miles.

In order to take care of the increased freight business in Philadelphia, a new freight station was completed this year on Sixteenth and Carpenter Streets. The demands of the Government for the past two years for freight equipment has prevented the road from furnishing all the freight equipment needed in their own business.

1864

Miles of Road Operated	105	No. of Locomotives	49
Philadelphia to Baltimore &		No. of Cars	1145
New Castle.			

The report covering the activities of the road for this year is signed by Mr. Geo. A. Parker, President, pro tem, Mr. Felton having resigned, though he continues to serve in the capacity of a Director in the road he had so faithfully served.

Five of the thirteen piers in the building of the Susquehanna Bridge have been completed.

The Delaware Railroad earned a handsome profit of \$46,976.18 during the year, the first time the revenue has exceeded the expenses.

In connection with the Philadelphia & Reading Railway, a large coal wharf was erected at New Castle for winter shipments of coal when the ice in the Delaware obstructed the ferries and for shipments of coal to foreign countries at all times of the year. This work was commenced in 1862 and not completed until 1865.

In the report for locomotives we find the engines on the Main Line are numbered 1 to 41 inclusive.

1865

Miles of Road Operated	105	No. of Locomotives	60
Philadelphia to Baltimore &		No. of Cars	1133
New Castle.			

The report for the year 1865 is signed by Mr. Isaac Hinckley as President. Mr. Enoch Pratt is Vice President and Mr. Alfred Horner is Secretary and Treasurer.

Work on the Susquehanna Bridge progresses. Ten of the thirteen piers have been completed. The abutment on the eastern end is nearly finished and the masonry on the Havre-de-Grace end has been brought to a level of the coping of the piers. Two spans of superstructure of 250 feet each have been erected and two more are ready for raising.

Work of double-tracking the road continues. In 1864 twenty-six miles of second track was laid and in 1865 nine miles were laid.

The Company is required by law to report its financial condition on October 31st and it has been voted to make the year of the company end on this date also.

In this report appears the last list of locomotives showing the names. Names are continued however on the branch roads until 1869, but the report for Oct. 31st, 1870 shows a consolidated list bearing no names.

P. W. & B. R. R. Locomotives—Oct. 31st, 1865

	Name	Builder	Date	Cylinders	Dia. of Drivers	Wt. of Engine
1		Baldwin	1865	11x16"	36"	36050
2	Brandywine	"	1848	12 1/2 x 20"	56"	38760
3	Mississippi	New Castle	1848	14 1/2 x 20"	60"	41200
4	Baltimore	P W & B	1849	13x24"	63"	38000
5	Empire	"	1851	14x26"	72"	48700
6		Baldwin	1865	15x18"	42"	59850
7	Wilmington	New Castle	1852	15x20"	66"	51400
8	Cincinnati	"	1853	"	66"	49400
9		Baldwin	1864	12x18"	36"	37230
10	Sampson	New Castle	1853	17x22"	50"	51840
11	Goliath*	"	1853	"	50"	44870
12	America*	"	1854	"	66"	52680
13	Magnolia	P W & B	1854	18x22"	68"	52870
14	C. W. Morris, Jr.*	New Castle	1854	17x22"	66"	56380
15	Constitution	"	1854	"	66"	51970
16	Daniel Webster	Taunton	1858	16x22"	66"	62900
17	Henry Clay	"	1858	16x24"	64"	64800
18	Geo. Washington	Baldwin	1859	15x22"	66"	60250
19	John E. Thayer	"	1859	16x24"	60"	66600
20	William Sturgis	Taunton	1860	16x22"	66"	57550
21	J. M. Forbes	Baldwin	1861	15x24"	66"	60150
22	Edward Austin	"	1862	14x24"	66"	58850
23	Joseph Holt	"	1862	16x24"	60"	58850
24	Geo. B. McClellan	Taunton	1862	16x22"	60"	58800
25	Winfield Scott	Baldwin	1862	16x24"	66"	69480
26	S. F. Dupont	"	1862	"	60"	66900
27	E. M. Stanton	"	1862	"	66"	65400
28	Massachusetts	"	1862	"	66"	66600
29	Union	"	1862	"	60"	64825
30	Monitor	R. Norris & Son	1863	17x24"	54"	66800
31	New York City	Wm. Mason	1863	16x24"	60"	56200
32	Washington City	"	1863	"	60"	58730
33	Ironsides	R. Norris & Son	1863	"	60"	60650
34	W. S. Rosecrans	"	1863	16x22"	60"	60350
35	G. H. Thomas	"	1864	"	60"	60250
36	Susquehanna	"	1864	18x22"	54"	67500
37	Chester	"	1864	16x22"	54"	63300
38		Baldwin	1864	16x24"	66"	66450
39		"	1864	"	66"	65000
40		"	1864	"	66"	66200
41		"	1864	"	66"	66100
42		Taunton	1864	"	60"	59530
43		"	1864	"	60"	57850
44		R. Norris & Son	1864	15x22"	60"	57250
45		Hayward, Bartlett & Co.	1864	18x24"	65"	61850
46		Taunton	1865	16x24"	60"	57580
47		Schenectady	1865	"	60"	58300
48		R. Norris & Son	1865	15x22"	60"	56000
49		Taunton	1865	16x24"	66"	58370
50		"	1865	"	66"	61050
51		Baldwin	1865	"	66"	64700
52		Hayward, Bartlett & Co.	1865	"	65"	64450

*Transferred to the Delaware Railroad.

P. W. & B. Locomotives Used on the New Castle & Wilmington, New Castle & Frenchtown, Delaware, Eastern Shore and Junction and Breakwater R. Rts.

Virginia	New Castle	1854	15x20"	60"	45000
Boston	"	1848	14½x20"	60"	41800
Delaware	"	1851	15x20"	66"	42070
Philadelphia	"	1852	13x20"	60"	39250
New Castle	"	1852	"	60"	39350
William Penn	"	1855	17x22"	66"	51500
Thomas Clayton	"	1857	13x20"	60"	39500
Princess Anne	"	1858	15x20"	66"	45500
Gollah	"	1853	17x22"	50"	44870
America	"	1854	"	66"	52680
C. W. Morris Jr.	"	1854	"	66"	56380

As late as 1880 there were two New Castle locomotives in service though both had been rebuilt by the road.

Of the engines listed on the Main Line, all burned coal with the exception of seven.

1866

Miles of Road Operated109	No. of Locomotives58
Philadelphia to Baltimore, New	No. of Cars1023
Castle & Port Deposit.	

On Nov. 28th, 1866, the bridge over the Susquehanna River was placed in service. Work was delayed by a tornado on July 25th of this year in which nearly half a mile of the finished bridge was swept into the river. Up to Oct. 31st of this year over a million and a half dollars had been expended.

The work of double tracking the road continues and save for fourteen miles the work is completed.

On December 17th, 1866, the branch extending to Port Deposit was opened for travel. Although this branch had been graded and made ready for laying the rails, the latter was delayed on account of the war. By the terms of the charter it was necessary to complete the work this year.

In order to pay for these three improvements, the directors authorized the issue of six per cent Bonds to the amount of \$1,000,000.00.

1867

Miles of Road Operated109	No. of Locomotives59
Philadelphia to Baltimore, New	No. of Cars?
Castle & Port Deposit.	

As the result of the War, the road has experienced a large loss of passenger business. Freight and express receipts show an increase and the Delaware R. R. paid a profit to the road.

The piers of the Susquehanna River bridge having withstood three winters. It is believed the bridge will withstand wind and ice.

1868

Miles of Road Operated	109	No. of Locomotives	57
Philadelphia to Baltimore, New		No. of Cars	1176
Castle & Port Deposit.			

During the year The United States Supreme Court declared that it was unconstitutional for a State to levy a tax upon interstate traffic. In 1864 the State of Delaware levied a tax of 10c upon all passengers that passed through the state. In compliance with this statute the road has paid \$360,000.00 to the State of Delaware. This tax does not affect passengers carried within the boundaries of the State.

The lease of the Delaware R. R. provided that the P. W. & B. R. R. should guarantee the 6% dividends on the stock and that one-half of any surplus is to be paid that road after the rent and working expenses have been paid. Question arose as to the meaning of this provision and it was decided by referees in favor of the P. W. & B. R. R., that there was no divisible surplus until that road had been reimbursed for all losses suffered in connection with operating the road. The aggregate loss to date was about \$200,000.00.

During the year the Wicomico & Pocomoke R. R. from Berlin to Salisbury was completed. The Chester Creek R. R., connecting the eastern terminus of the Philadelphia & Baltimore Central R. R., with the P. W. & B. R. R. at Chester, Pa. has been completed.

1869

Miles of Road Operated	109	No. of Locomotives	59
Philadelphia to Baltimore, New		No. of Cars	1181
Castle & Port Deposit.			

We find mentioned in this report the results of steel rails as compared with iron rails. Over thirty miles of this road was laid with English Steel Rails and not one has been removed for an imperfection. Two American Steel Rails out of 2000 have been removed on account of imperfections. These rails cost about 20% more than the best iron rails and it is intended to use steel rails hereafter for renewals.

The Peach crop of the Peninsula was very large this year and the road handled four thousand car loads.

The Dorchester & Delaware R. R. which with the Dorchester Branch of the Delaware R. R. extends from Seaford on the Delaware R. R. to Cambridge, Md., a distance of thirty-three miles, was opened this year.

The Maryland & Delaware R. R. was opened to Easton, a distance of forty-four miles. This road connects with the Delaware R. R. at Clayton.

Other roads are being built which will act as feeders to the Delaware and P. W. & B. roads.

An adjustment appears in the Balance Sheet with regard to the old New Castle & Frenchtown stock. This stock was carried by the P. W. & B. R. R. on their books as worth \$861,235.00. On account of the sale of the steamboats, it was reduced in 1858-59 to \$744,425.00. Since all but six miles of the track has been torn up and the line discontinued, the experts valued the stock at \$150,000.00 and the road charged \$594,425.00 to "Revenue Account".

1870

Miles of Road Operated109	No. of Locomotives 58
Philadelphia to Baltimore, New	No. of Cars1148
Castle & Port Deposit.	

The directors decided to build a new road between Gray's Ferry and Chester. Work has already been started.

Our report for the year is an exception for brevity.

We must assume that the Queen Anne & Kent and the Kent County roads are completed and the Junction & Breakwater R. R. has been completed from Harrington to Lewes, a distance of forty miles.

1871

Miles of Road Operated109	No. of Locomotives 61
Philadelphia to Baltimore, New	No. of Cars1310
Castle & Port Deposit.	

Over five thousand ear loads of eight tons each, of peaches were received from the Delaware R. R. This business has quadrupled since 1865.

The engine house and shops at Wilmington were destroyed by fire on May last.

1872

Miles of Road Operated109	No. of Locomotives?
Philadelphia to Baltimore, New	No. of Cars?
Castle & Port Deposit.	

No mention is made of the number of locomotives and cars owned by the road this year. Mention is made however that all passenger and baggage cars have been fitted with the Miller platform.

None but steel rails or rails having steel heads are used. Wharton switches and self adjusting steel frogs are used.

On the peninsula the Worcester & Somerset R. R. extending from Newtown on the Pocomoke River to the Eastern Shore R. R., a distance of nine miles has been completed. Also, the Worcester R. R. from Snow Hill to Berlin on the Wicomico & Pocomoke R. R., a distance of fourteen miles has been completed.

On the main line, the new road constructed between Gray's Ferry and Chester has been completed and the first passenger train passed over it on Nov. 18th, 1872. On July, 1873, the old road was leased to the Philadelphia & Reading Ry. for a long term of years.

1873

Miles of Road Operated109	No. of Locomotives 70
Philadelphia to Baltimore, New	No. of Cars1412
Castle & Port Deposit.	

During the year the road lost much on account of freshets. The stone arch bridge at Christiana was destroyed and replaced by an iron bridge. The breaking of a reservoir of the Chesapeake & Delaware Canal, swept away one half of the Delaware R. R. bridge over the Canal. This same freshet destroyed thirteen culverts on the Delaware R. R. By these accidents, traffic was delayed for eight days and the break coming

at the height of the peach season caused both roads to suffer much from loss of traffic.

The question of adequate mail pay appears again in the reports of this company. In 1850 the road received \$38,250.00 for compensation for carrying the mail. In 1873, the mail was carried in postal cars, first used in 1864 and the P. W. & B. R. R. was the pioneer in their use, carried the mails at higher speed, yet receiving only \$37,500.00. At a hearing held by a Senate Committee to investigate the subject of mail service on the railroads, it was brought out this road received 13c per 30 foot car mile while the express companies were paying 60c per 30 foot car mile. Congress alone dictated the compensation for the mail carried. On May 1, 1873 some of the carriers notified the Post Office Dep't that all mail cars would be withdrawn and mail carried in bulk in baggage cars. Mention is made of the Act of Parliament (2nd Victoria, 1838) which provides for a commission, mutually chosen, to settle cases of disputes as to rates.

1874

Miles of Road Operated109	No. of Locomotives ?
Philadelphia to Baltimore, New	No. of Cars ?
Castle & Port Deposit.	

The mild winter of 1873-74 which allowed uninterrupted water communication between Philadelphia, Wilmington and Baltimore together with a small peach crop made a decrease in freight receipts.

A new Post Master General caused this road to defer any drastic action by withdrawing mail cars from service. The weight of mails moved in November and December, 1874 and January, 1875, will form the basis of adjustment of mail pay commencing from July 1, 1874.

1875

Miles of Road Operated109	No. of Locomotives ?
Philadelphia to Baltimore, New	No. of Cars ?
Castle & Port Deposit.	

The company moved 9077 car loads of peaches during the year which is the largest ever moved. The strawberry crop which prior to 1871 never amounted to over five cars a day, in 1875 ran frequently as high as 90 cars a day. The peaches were successfully marketed, without change of cars, in Boston, Buffalo, Chicago and Cincinnati.

As the result of weighing the mails, this company has received a 40% increase in its compensation, amounting to about \$20,000.00.

In May of this year, the road purchased and owns all the stock with the exception of a few shares of the New Castle & Frenchtown and New Castle & Wilmington Railroads. These two together with the Southwark R. R. are now owned by the P. W. & B. R. R.

In August last, the road was completely double tracked from Philadelphia to Baltimore.

1876

Miles of Road Operated109	No. of Locomotives 78
Philadelphia to Baltimore, New	No. of Cars 1466
Castle & Port Deposit.	

On account of the Centennial Exhibition held this year at Philadelphia, the passenger receipts of the road increased 35.7%.

Mention is made of an expenditure of \$9,909.61 for Rousseau's Block signals.

On Broad & Carpenter Streets, Philadelphia, a new freight station has been erected. This relieves the passenger station as the freight business has been conducted in that station for some little time. The offices of the freight department and the offices of the Philadelphia & Baltimore Central R. R. are in the head house of the new freight station.

During the year the lease of the Delaware R. R. was renewed for twenty-one years at 6% per annum.

1877

Miles of Road Operated	109	No. of Locomotives	?
Philadelphia to Baltimore, New		No. of Cars	?
Castle & Port Deposit.			

Work of replacing the old wooden structure of the Susquehanna Bridge with iron which was commenced in 1873 has proceeded so that eleven of the thirteen spans have been changed. One will be replaced in 1878 and the draw span will be completed in 1879.

In Baltimore, the road acquired a lot of land lying between Boston Street and the water. It is intended to place tracks on this land and form an interchange of traffic here between the Baltimore & Ohio R. R. and the Baltimore Steam-Packet Co.

A curious accident is mentioned in which a cow which was at large in the city of Wilmington was struck by a train. No life was lost save that of the cow but the train was derailed and several passengers were injured.

Mr. S. T. Fuller, Engineer, has put into the effect the system of determining the life of each rail. Each rail is numbered on the stem, inside near the middle of the rail. The "Location Book" shows the location and length of each lot of rails on each mile of track, the pattern and section of rail, date of laying and kind of joint. The "Rail Book" shows the section and number of each rail, the joint, date when laid and removed, the track and location of track and the disposition of the rail.

1878

Miles of Road Operated	109	No. of Locomotives	78
Philadelphia to Baltimore, New		No. of Cars	1367
Castle & Port Deposit.			

We find little of interest for the activities of this year. The mild winter, together with a failure of the peach crop and with the business depression caused the receipts to be less than any year since 1870.

On December 18, 1878, the Board of Directors met and passed resolutions on the death of Mr. Benj. H. Latrobe, formerly Chief Engineer in the construction of this road between Baltimore and the Susquehanna River and later as Consulting Engineer on the Susquehanna River Bridge.

1879

Miles of Road Operated	109	No. of Locomotives	76
Philadelphia to Baltimore, New		No. of Cars	1444
Castle & Port Deposit.			

In view of the inconvenience and loss of time caused by drawing passenger cars enroute to the Baltimore & Ohio R. R. Station by horses, an agreement has been made by that company under which the transfer is to be made by a ferry-boat, jointly owned and large enough to take a full train of passenger cars or twenty-seven freight cars between Canton and Locust Point, Baltimore.

Stone ballast, substituted for gravel ballast, which was commenced in 1878 has been continued and on Oct. 31, 1879 there were twenty-five miles laid in stone ballast.

1880

Miles of Road Operated	136	No. of Locomotives	78
Philadelphia to Baltimore, New		No. of Cars	1510
Castle & Port Deposit.			

In order to eliminate accidents and to save time in passing through Wilmington, some twenty acres of land has been purchased and arrangements made for the transfer from the old tracks and property.

The "Bay View Improvement" enabled the road to make up freight trains in Baltimore outside the city limits.

During the year all but forty-four shares of the stock of the West Chester & Philadelphia R. R. Company were purchased at a cost of \$821,194.25. This road furnishes direct connection from Philadelphia with the Philadelphia & Baltimore Central R. R.

1881

Miles of Road Operated	136	No. of Locomotives	87
Philadelphia to Baltimore, New		No. of Cars	1488
Castle, Port Deposit & West Chester.			

The conclusion of the Philadelphia, Wilmington & Baltimore R. R. as a separate road is reached in 1881. The road was a "key" road and the Baltimore & Ohio and the Pennsylvania Railroads both wished control of it. Possibly the B. & O. precipitated the situation somewhat, when early in 1880, they announced that their two through trains between Washington and New York, would operate from Philadelphia over the Philadelphia & Reading and Central R. R. of New Jersey, called the "Bound Brook Route", instead of over the congested Pennsylvania R. R. The Pennsylvania R. R. tried to stop the trains passing over the Junction R. R., jointly owned by that road, the P. W. & B. R. R. and the P. & R. Ry., but the B. & O. held their ground and continued to use the "Bound Brook Route". Emissaries from both the B. & O. and P. R. R. approached Mr. N. P. Thayer and his associates of Boston and on February 22nd, 1881, the eastern papers announced that Mr. Garrett, President of the Baltimore & Ohio R. R., had secured control of the P. W. & B. R. R. Two weeks later, the sad news reached Mr. Garrett that the Pennsylvania R. R. had purchased from Mr. Thayer and his associates for \$80.00 a share and the control of the Philadelphia, Wilmington & Baltimore R. R. passed to the Pennsylvania R. R.

A glance at the map of the P. W. & B. R. R. for 1881 is of interest. The so-called Main Line extended from Philadelphia to Baltimore, New-ark to Delaware City and Wilmington to Porter, Del. It operated by lease the Delaware R. R., extending from Porter to Delmar and it controlled through stock ownership the West Chester & Philadelphia R. R. from Lamokin to West Chester, the Philadelphia & Baltimore Central R. R., extending from Philadelphia to Octorara a few miles above Port Deposit and connected by the Columbia & Port Deposit R. R. On the Peninsula we find the Kent County R. R. extending from Massey's on the Delaware R. R. to Chestertown; the Queen Anne & Kent County R. R. operated by the Delaware R. R. extending from Massey's to Centre-ville; the Junction & Breakwater R. R. extending from Harrington on the Delaware R. R. to Lewes; the Maryland & Delaware R. R., from Clayton to Oxford, Md.; the Dorchester & Delaware R. R. whose bonds were held by the P. W. & B. extended from Oak Grove on the Delaware R. R. to Cambridge; the Eastern Shore R. R. extending from Delmar to Crisfield; the Wicomico & Pocomoke R. R. extending from Salisbury on the Eastern Shore R. R. to Berlin and the Worcester R. R. extending from Berlin to Snow Hill. All of these roads, save the Eastern Shore R. R. entered the Pennsylvania System at a later date. The Eastern Shore R. R. served as a nucleus for the New York, Philadelphia & Nor-folk R. R. The later company acquired the Eastern Shore R. R. in June, 1884. Using 29 miles for the main line it built south to Cape Charles, Va. There a harbor was built for the boat service to Norfolk. This road, jointly owned by the Philadelphia, Wilmington & Baltimore and the Pennsylvania Roads was opened for service on Oct. 25th, 1884 and has been a much used and valuable route for the transportation of per-ishable freight.

The road at the time of its lease owned 87 locomotives. From 1870 on nearly all of the locomotives were either constructed in their own shops or purchased from the Baldwin Locomotive Works.

The list of cars owned by the road on Oct. 31, 1881 is reproduced herewith:

- 50 Twelve Wheel Passenger Cars.
- 62 Eight Wheel Passenger Cars.
- 4 Twelve Wheel Parlor Cars.
- 9 Twelve Wheel Smoking and Baggage Cars.
- 12 Eight Wheel Smoking and Baggage Cars.
- 5 Twelve Wheel Baggage Cars.
- 14 Eight Wheel Baggage Cars.
- 8 Eight Wheel Baggage and Mail Cars.
- 20 Eight Wheel Express Cars.
- 3 Eight Wheel Milk Cars.
- 1 Eight Wheel Pay Car.
- 1 Eight Wheel Calf Car.
- 772 Eight Wheel House Cars.
- 8 Eight Wheel Refrigerator Cars.
- 62 Eight Wheel Stock Cars.
- 361 Eight Wheel Platform Cars.
- 65 Eight Wheel Lime Cars.
- 2 Four Wheel Dump Cars.
- 13 Four Wheel Lumber Trucks.
- 3 Wood Cars.
- 6 Tool Cars.
- 2 Crane Cars.
- 5 Construction Cars.

On November 1st, 1902, the Philadelphia, Wilmington & Baltimore R. R. was consolidated with the Baltimore & Potomac R. R., and a new company, the stock of which was owned by the Pennsylvania R. R., called the Philadelphia, Baltimore & Washington R. R. was formed. Thus the line from New York to Washington, of which the P. W. & B. had played such an important part, was placed under one management.

Philadelphia, Wilmington & Baltimore R. R.

Year Ending	Number of Passengers	Passenger Earnings	Tons of Freight	Freight Earnings	Net Earnings	Dividends Paid
1838	146410	\$296796.74	—	\$41204.46	—	4%
1839	213650	414974.76	—	39239.27	—	7½%
1840	—	—	—	—	—	7½%
1841	—	378877.72	—	44809.38	\$296929.70	7½%
1842	—	310667.07	—	38700.02	195662.23	3½%
1843	—	—	—	—	—	None
1844	—	—	—	—	257289.42*	None
1845	—	—	—	—	229007.38*	None
1846	236325	—	—	—	281848.55*	None
1847	285325	—	—	—	296170.16*	None
1848	291538	—	—	—	306816.44*	None
1849	292521	380429.24	—	60977.01+	156055.00*	3%
1850	297278	406534.39	—	56741.19+	195721.48*	3½%
1851	360594	451768.56	—	83259.93+	204817.96*	3½%
1852	388756	522764.82	—	96377.76+	214822.76*	4%
1853	516663	696618.00	—	120236.04+	345088.02	5%
1854	650051	727559.61	—	149197.05+	366886.14	3%
1855	653003	692790.60	64334.8	191613.00+	32846.88*	12% £
1856	—	745714.99	—	301742.90+	282846.88*	2%
1857	—	775615.43	—	284371.19+	378935.59*	4%
1858	—	763579.55	—	251542.51+	344152.79*	5%
1859	—	718071.18	—	238794.81+	437499.01*	6%
1860	—	831305.71	—	317568.87+	471712.19*	6½%
1861	629098	1067275.42	58368.2	363552.98+	675483.80*	6½%
1862	854598	1645024.83	175972.4	506350.25+	1080995.17*	9%
1863	1071961	1834133.75	217034.4	619562.08+	1042266.42*	10%
1864	1351416	2423088.83	240298.1	697169.59+	134331.93*	10%
1865	1385921	2992656.20	235929.8	771176.30+	1001630.03*	10%
1866	750159	1685315.98	260294.4	720554.90+	981795.27*	5%
1867	—	1503297.62	—	818511.77+	790418.05*	9%
1868	781806	1437459.95	281418.	838540.78+	776414.83*	8%
1869	—	1508612.30	—	915112.61+	805706.91*	8%
1870	—	1530240.69	—	878494.16+	798267.88*	8%
1871	—	1532820.03	—	1044760.50+	912221.79*	8%
1872	—	1608214.74	—	1088676.36+	1113790.13*	8%
1873	—	1728957.71	—	1225801.15+	1002953.81*	8%
1874	—	1747053.16	—	1011108.67+	1043831.06*	8%
1875	—	1690722.15	—	1051692.69+	1104764.63*	8%
1876	—	2294622.22	—	915498.82+	1180734.27*	8%
1877	—	1644790.99	—	955068.04+	1073821.24*	8%
1878	—	1517513.11	—	882157.31+	1095102.75*	8%
1879	—	1541049.95	—	1176081.15+	1171239.56*	8%
1880	—	1767219.20	—	1399369.47+	1234977.13*	8%
1881	—	1903475.81	—	1433998.75+	1131361.36*	8%

£ = Stock Dividend.

+ = Express receipts are included with the Freight Receipts.

* = The net earnings include those of the operated roads such as the New Castle & Frenchtown and the Delaware R. R. when there was any surplus from that road.

Some Interesting Comments on Bulletin No. 19



HE Michigan Central Railroad was seen by me in 1878 for the first time. The Ferryboat, plying slowly across the Detroit River from the wharf of the Great Western Railway of Canada, gave me a good view of the City with its frontage of limitless lumber stacked in tall piles ready for shipment. On one of the sidings leading to a wharf stood a locomotive with a wisp of vapor rising from the bonnet stack. Distance prevented reading either name or road number and piles of boards soon concealed the locomotive. In general its features resembled the one depicted at page 11 of the Bulletin and it may be that it was a survivor of the "Persian type, rounding out its career with light work in that quarter of the Michigan Central Terminal.

The station was the next object to observe. It was a brick structure evidently several years old. Its facade was grimy and the panes of its windows were dim from want of wiping. The waiting room was even less inviting for it was foul and unswept and a noisome smell made it repellent. It was a relief to pass through to the platform and enter the train. Quite in contrast the cars were clean and comfortable. In all respects they were equal to those of the New York Central of that era and were similar to the one shown at page 27, except that they were provided with Miller Coupler Buffers instead of link and pin.

With the exception of that lone locomotive on the River side, all the locomotives in our vicinity were coalers carrying diamond stacks. No attempt at ornamentation was seen—all were sober looking iron steeds but were efficient if one may judge the lot from the manner in which our locomotive pulled the train.

The able men who had completed the line into Chicago and who had directed its affairs so intelligently had laid down the reins. That they were managers abreast of their railroad generation, and that they took pride in keeping locomotives, cars and other appurtenances neat and attractive, is the testimony alike of History and Tradition. But their successors who took up the reins of management belonged to a different order. They were mere speculators operating by proxies on the shares and their aim was to make for themselves all the money possible during their tenure. In the upkeep of the property resort was had to thrift, often of a petty and irritating quality. They disregarded the passengers—looking upon them as cattle who could load and unload themselves. The solicitude of these managers turned toward freight traffic. It does not take long for a neglected railroad to show dilapidation and when this regime was ousted by actual control passing to the Vanderbilts the latter were confronted with a tedious task of renovation. It could not be completed in a day and when I saw the Michigan Central in 1878 it had only begun to re-ascend from its nadir although, as noted, progress had been made with cars, and the local service, by frequent trains was very well arranged. Under the Vanderbilt management the road improved

steadily and the evidences of neglect were effaced. The last act of Commodore Vanderbilt, as he lay on his dying bed, was to secure control of the Canada Southern Railway. This control brought into effect a single system from Chicago to Buffalo and service was expanded by fine through trains. One of these was the North Shore Limited for so many years a favorite of the travelling public. How it used to fly along those straight stretches in Ontario!

At Ypsilanti the line reached the Huron River which has eroded a passage through glacial detritus. The Huron has many turns as it winds through the eroded pass and to me it was absorbing to note the faint traces of the original route of the railroad as it went up this ascent leading to the table land near Delhi Mills. The road in early days hugged the foot of the abrupt bank and conformed to every cove and promontory. Its crookedness was remarkable and the curves extremely sharp for the line in no instance scarped a headland or filled in across a cove. The traces of the layout gave a vivid picture of the ideas of Civil Engineers as to construction of a railroad in the '30s and the trains must have slowed down to a walk between Ypsilanti and the summit near Delhi Mills. The alignment of the later construction while not free from curvature was a great improvement.

INGLIS STUART.



E have received several requests for copies of Bulletin No. 11. If any of our members have copies of this bulletin they do not care for the Society will refund them the original cost of same. Several of our members are interested in completing their set of "Baldwin Records" and any of our members who have any spare copies will they kindly advise such numbers as they may have. Please address all replies to C. E. Fisher, 6 Orkney Road, Brookline, Mass.

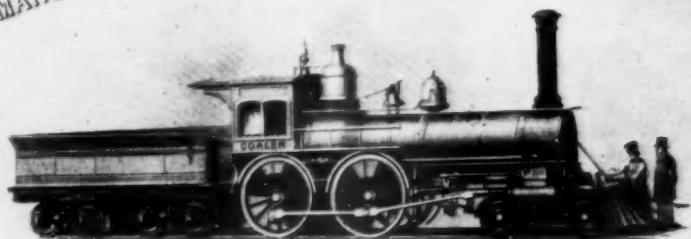
IN MEMORY OF
CHARLES N. DEFOREST

63 East 79th St.,

New York, N. Y.

Who Died on December 19, 1929.

TAUNTON LOCOMOTIVE MANF. CO.
MANUFACTURE FIRST CLASS WOOD AND COAL BURNING



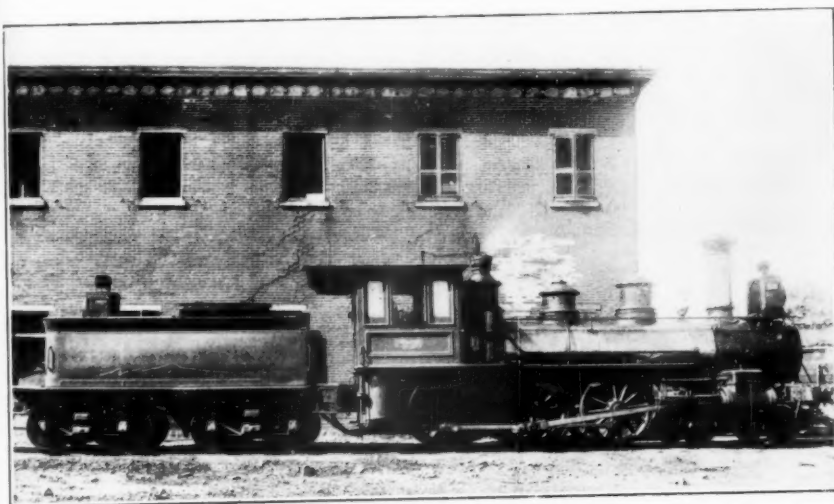
LOCOMOTIVES.

W. A. CROCKER TREAS.

W. W. FAIRBANKS AGT

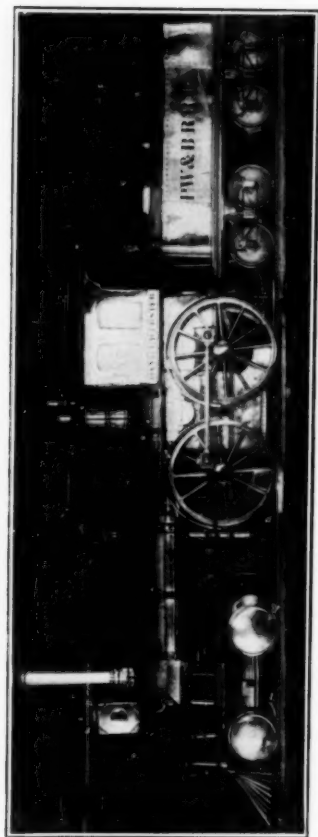
TAUNTON, MASS.

A Business Card of the Taunton Locomotive Works of 1858 Advertising the "Daniel Webster"

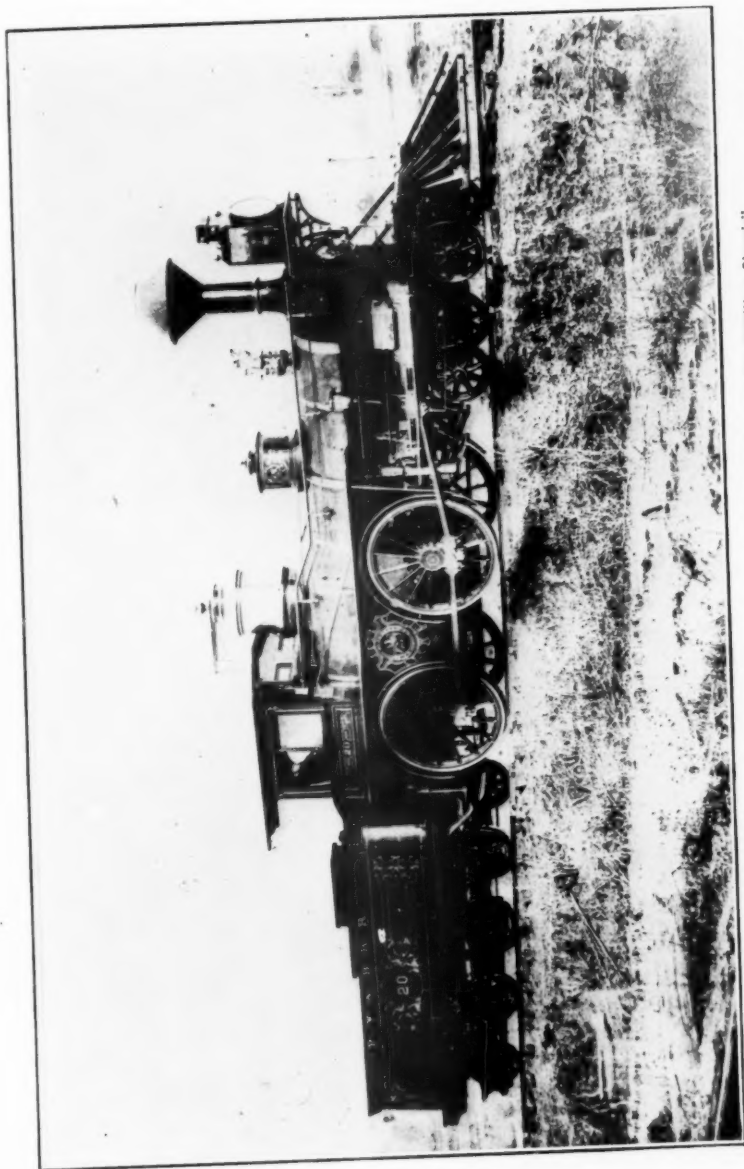


P. W. & B. R. R. #63, Grant 1872, Shown Here as Rebuilt

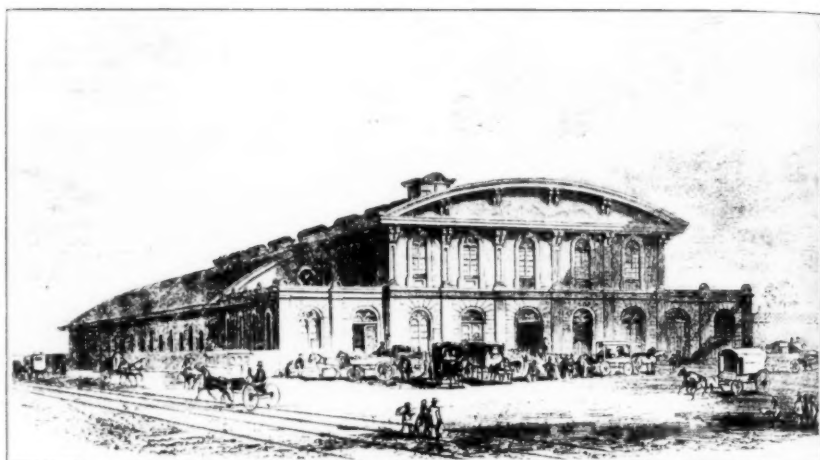
Courtesy R. C. Schmidt



The Silver Model of the "Daniel Webster" Presented to Mr. S. M. Felton
Courtesy of E. C. Felton



P. W. & B. R. R. #20, Taunton L. W. 1860, Rebuilt by P. W. & B. 1874. Originally the "William Sturgis"
Courtesy of Geo. P. Becker

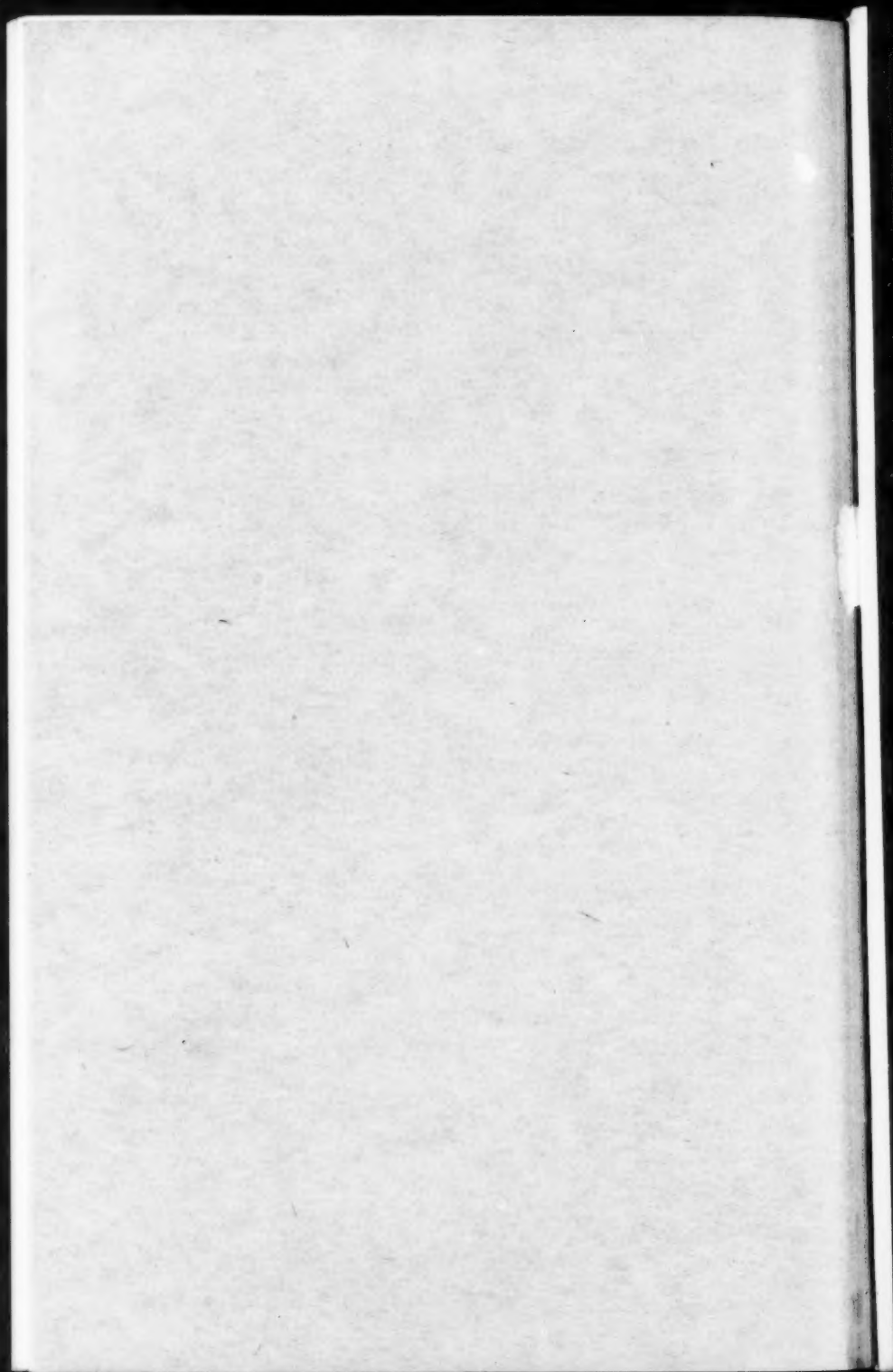


F. W. & B. R. R. Station at Broad and Prime Streets, Philadelphia, 1856

COURTESY E. H. R. R.



The Passenger and Freight Stations in Philadelphia, 1876



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**The Railway and Locomotive Historical Society,
INC.**

Baker Library, Harvard Business School,

Boston, Massachusetts.

March 1, 1932.

Cape Cod Branch Railroad.

OPENED TO WAREHAM

WILL LEAVE THE DEPOT OF THE OLD COLONY RAILROAD.

ARRANGEMENTS FOR PASSENGERS.

On and After Wednesday, January 26th, 1848, Passenger Trains will Leave Boston and Wareham, daily Sundays excepted, as follows:—

Leave Boston 7.45 A. M. and 3.45 P. M.

Leave Wareham 7.17 A. M. and 3.21 P. M.

Intersecting with the Fall River Railroad at Middleboro, which trains intersect with the Taunton and New Bedford trains at Myricks Station.

Stages leave Wareham daily on the arrival of the trains from Boston for Agawam, Sandwich, etc.

L. HAVEN,

Superintendent.

(The above is a copy of the first time table of the Cape Cod Branch Railroad, taken from the files of the Boston Courier.)

The Railroads on Cape Cod.

The Cape Cod Branch Railroad was incorporated April 8, 1846 with authority to build a road from a point near the Four Corners in Middleboro to Sandwich. The road was opened to Wareham on January 26, 1848; to Agawam on January 31, 1848 and to Sandwich on May 29, 1848.

On February 22, 1854, the name was changed to the Cape Cod Railroad and the road extended to Hyannis and opened to that point on July 8, 1854.

The Cape Cod Central Railroad was organized on March 28, 1861 to build a road from Yarmouth to Orleans, to connect with the Cape Cod Railroad at the former point. The road was opened in 1864 and on Apr. 21, 1868 was sold to the Cape Cod Railroad. The latter extended the road to Wellfleet which was opened on December 29, 1870. The Cape Cod Railroad was consolidated with the Old Colony Railroad under the Act of March 27, 1872 and the consolidation was formally completed on September 30, 1872.

In 1873 the Old Colony Railroad built the extension from Wellfleet to Provincetown and on Wednesday, July 23, 1873 regular trains began running between Boston and Provincetown for the first time. The Fairhaven Branch was opened on October 2, 1854 as the Fairhaven Branch Railroad. The Woods Hole Branch was opened on July 18, 1872 and the Chatham Branch on November 21, 1887.

The famous "Dude Train", the private summer express between Boston and Woods Hole, made its first trip on June 23, 1884. The train was drawn by the engine "Foxboro", No. 100 and consisted of Old Colony combination car 168 and Old Colony Drawing Room Cars "Naushon" and "Mayflower". The first crew was Conductor Harry Meyers, Engineer James Davis, Fireman Edward Proud, Baggage-master Wyman Lincoln and Brakeman Walter Pierce. On June 13, 1892, the "Fairhaven Dude", a similar private train was placed in service for Marion, Mattapoisett and Fairhaven. In the summer of 1896 these two trains were consolidated.

With the passing of the control from the Old Colony R. R. to the New York, New Haven & Hartford R. R., the lines on the

Cape were formerly known as the Cape Cod Division and now they are a part of the Boston Division of the New Haven System.

Our members may be interested to learn that this Society has acquired some very interesting material from the Cape Cod Railroad that is now in the Baker Library. We have framed and on the walls the following:

Cape Cod R. R. Locomotive "Highland Light" (colored drawing).
Cape Cod R. R. Employees Time Table of 1848.
Cape Cod R. R. Employees Time Table of 1853.
Cape Cod R. R. Notice of 1859 announcing stop of special train at the "Quaker Meeting-House" Crossing. (This was near the East Sandwich Station and the Quaker Meeting House is still there).
Cape Cod R. R. Employees Time Table No. 7, Nov. 7, 1859.
Cape Cod R. R. Last Time Table issued by Cape Cod R. R. in 1872.
Old Colony R. R. Cape Cod Div. Poster, June 23, 1884.
Old Colony R. R. Notice of the Opening to Provincetown in 1873.
Old Colony R. R. train on Provincetown Wharf.
Old Colony Depot at Boston showing sign of the Old Colony Passenger Station, Central and Cape Cod Divisions.
Old Colony R. R. Cape Cod Div. engine and caboose at Hyannis.
Photographs of Supts. C. H. Nye, J. H. French and J. R. Kendrick, afterwards General Manager.
Photographs of nearly all of the old Cape Cod R. R. Conductors and of Silas D. Fish, an Engineer.

In the Glass Cases.

Complete set of first tickets issued by the Cape Cod Branch R. R. covering all stations between Middleboro and Sandwich. (Rock Station was then Rock Meeting House; Buzzards Bay was Cohasset Narrows and Bourne, Bournedale and Sagamore were Monument, North Sandwich and West Sandwich respectively).
First ticket punch used on Cape Cod R. R. by Conductor C. H. Nye.
First Woodman ticket punch on Cape Cod R. R. used by C. H. Nye.
Conductors Lantern of J. B. Brown, his name on the globe. Lantern made at the Sandwich Glass Works.
Early Conductors watch, made in England, and carried by J. B. Brown.
Cape Cod Branch R. R. stock certificates.
Cape Cod Railroad Ticket Reports.
Photograph of locomotive "Cape Cod" on Cape Cod R. R.
Photograph of Conductor A. S. Messer of the "Dude Train."
Photograph of Nathaniel Sears, Cape Cod R. R.
Car card of the "Dude Train."
Photograph of Conductor A. W. Cushman of the "Dude Train."
Photograph of Conductor Harry Meyers of the "Dude Train."
Early spike used on Cape Cod R. R.
Many time tables, notices, conductors checks, etc.
Also
Section of rail of the Cape Cod Railroad.

The Annual Meeting.

The Annual Meeting of the Society was held in its rooms in the Baker Library, Harvard Business School, Boston, Massachusetts on January 31st., with members Becker, Eaton, Fisher, Fogg, Hungerford, Jacobs, Merrill and Withington present, also Messrs. Taber, Lucas, Norrell, Landon and Thomas attended.

The report read by President Fisher included the following items of interest.

During the year 43 new members were added but the Society lost by death one Life Member and two Annual Members. The membership now includes 36 Life Members, 8 Contributing Members and 235 Annual Members making a total of 277 memberships in this Society.

In 1931 three bulletins were published and a total of 1031 copies of our bulletins were distributed.

The Exchange Manager reports an increase from 36 to 77 members who are interested in the Exchange Department.

The Room Committee reports the addition of much material of value and interest to the Society and our members.

The report of the Treasurer will be found elsewhere in this leaflet.

The following men were elected Directors of the Society to serve for 1932: Geo. P. Becker, Charles C. Eaton, Charles E. Fisher, Walter R. Fogg, Edward Hungerford, Warren Jacobs, John W. Merrill, W. O. Moody and Sidney Withington.

CHARLES C. EATON,
Secretary.

February 1, 1932.

Immediately following the Annual Meeting the Directors of the Railway & Locomotive Historical Society held a meeting to which Messrs. Taber, Lucas, Norrell, Landon and Thomas were invited.

The following were elected officers of the Society to serve for the year 1932; Charles E. Fisher, President; Edward Hun-

gerford, Vice President; Charles C. Eaton, Secretary and Geo. P. Becker, Treasurer.

Mr. Warren Jacobs was appointed Assistant Secretary and all other appointments were filled by the same men who now occupy those positions.

A general discussion followed in which all participated in which was brought up how this Society could serve its present members better and attract new members to the Society.

CHAS. C. EATON,
Secretary.

February 1, 1932.

The following is a brief summary of the Report of the Treasurer, presented and accepted by the Directors at the meeting held January 31, 1932.

Receipts.

Balance from 1930		\$ 806.64
1931 dues received	\$ 130.50	
General Receipts	149.24	
Contributing Memberships	150.00	
Pennyroyal Prints	205.00	
Sales of Photographs	38.21	
Total Receipts from Bulletins	960.00	\$1632.95
Total Receipts—1931		\$2439.59

Disbursements.

Total Cost of Bulletin #24	\$ 153.94
Total Cost of Bulletin #25	248.93
Total Cost of Bulletin #26	245.57
Expenses in Connection with the Rooms	27.55
General Expenses	1173.10
Balance on Hand—Dec. 31, 1931	570.50
Total	\$2439.59

The Life Membership Fund amounts to \$108.93. The Society credits \$1.00 to each of the miscellaneous bulletins issued during the current year from the dues of the Annual Members and the other \$1.00 goes towards running the Society.

GEO. P. BECKER,
Treasurer.

Brookline, Mass., February 5th, 1932.

*To the Members of the Railway & Locomotive
Historical Society*

In spite of the general depression that has not only gripped this country but the entire world as well, the officers of this Society cannot help but feel that the year that has just past has been quite successful.

If we look at the matter from the viewpoint of service, and it is our purpose to serve our members and others as well, we have done a large amount of research work and we have met not only with hearty co-operation on the part of our members but with railroad officials, other societies and libraries as well. We have a large amount of material at our disposal here in the Baker Library and it is constantly growing.

The Publication Committee produced three bulletins during the past year, the two miscellaneous bulletins containing more illustrations than we have ever placed in our publications. The larger editions have been entirely warranted and with our growing membership and mailing list our bulletins are going farther afield than ever before.

The efforts made to secure new members has met with success for this year we added 43 new members to the rolls of this Society, the greatest ever added in a single year. Our members have shown a greater interest in our Exchange Department, thanks to the labors of our Exchange Manager and we now have 77 members participating in the Exchange Department.

The Room Committee has continued to do good work in the arrangement and care of material now in the Baker Library. Much material of value has been received during the year and to those who visit our rooms they will find much to interest them there.

Due to the untiring efforts of Warren Jacobs, we had the largest display of railway posters and travel literature ever placed in the Boston Public Library. With entirely new material, this exhibit will be repeated for two weeks—March 28th-April 9th and those who live in the vicinity of Boston are urged to visit the Boston Public Library, and see this wealth of material from every railroad in the world that will be on exhibition.

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In order that our members might procure photographs of material that they wished, the Room Committee suggested that our Exchange Manager approach our members with the view that such members as wished list such material that they wished and the terms by which it might be procured. This is entirely voluntary on the part of our members. You may withhold as much or as little material as you choose. The success of this Clearing House of information will depend on how well our members support it and the benefits will accrue to those who use this clearing house.

Our Representatives in the different sections of this country and the world have ever kept the interests of this Society before them and in spite of the many difficulties of the past year, have worked hard and done well. It has been a pleasure to work with all of our officers and in closing I wish to extend my sincere thanks to them for their efforts during the past year.

CHAS. E. FISHER,
President.

Membership Dues.

Annual Members—\$3.00 payable in advance, annually. Annual members will receive the two bulletins containing the miscellaneous material issued during the current year. They will not have the right to vote at the Annual Meeting.

Contributing Members—\$25.00 (or more) payable annually. Contributing members will receive all publications issued during the current year and will have the right to vote at the Annual Meeting.

Life Members—Membership fee \$50.00. Life Members will receive all publications during their membership and will have the right to vote at the Annual Meeting. Life Members elected prior to January 1st, 1930, upon payment of the difference of the old Life Membership fee and the present fee will receive all publications during their membership.

A Life Member may also be a Contributing Member. Life Members and Contributing Members may pay their dues to suit their convenience.

For the information of our newer members, the fiscal year ends on December 31st. Thus if any member joins during the year, his membership automatically expires on Dec. 31st. All publications to which his membership entitles him are sent him, no matter what date he joins, so that he receives the same amount of material as though his membership dated from January 1st.

The Pennoyer Set of Colored Prints.

We are again calling the attention of our members to this set of handsomely colored prints which should be of interest to our members. The originals were executed by Mr. A. Sheldon Pennoyer, a well known artist and a member of this Society. The plates were prepared and the lithographing done by that well known magazine—"Fortune". These plates have since been destroyed making this a very limited edition of these subjects.

The set includes "Snowbound", a Crampton type of locomotive on the Camden & Amboy R. R. of 1850; the "Pioneer" on the Cumberland Valley, built by Seth Wilmarth in 1851; an American Express train of the 70's drawn by a Rogers locomotive and through the kindness of the Delaware & Hudson Co. we are able to include the "Stourbridge Lion", imported by that road from England in 1829. Mr. Pennoyer has admirably grasped the technique of the early locomotive and has placed them in familiar surroundings. The size of the "Pioneer" is 7x11 while the other three are 8 $\frac{1}{4}$ x10 $\frac{1}{2}$. They are beautifully colored and the price is \$5.00 for the set. No set will be broken nor will samples be submitted. For a set of these pictures address Chas. E. Fisher, 6 Orkney Road, Brookline, Mass.

Wants of Our Members.

Under this caption, at various times in our bulletins, we have tried to list the books or other material that some of our members would like to procure. Our British Representative, Mr. D. S. Barrie has kindly offered his services to our **members**. Mr. Barrie has expressed a willingness to purchase in the London

book stores, such books as our members wish, if possible, if our members will advise him their wishes in this matter. Mr. Barrie has offered to give his services and the only charge that will be made to our members will be the actual cost of the book or the material plus the fee for postage. Some book dealers have a habit of advancing prices knowing that the material is to be purchased for a collector and Mr. Barrie's offer may enable our members to pick up some material they wish at a very reasonable rate. Mr. Barrie's address will be noted among the officers of this Society.

Our members who are interested in locomotive photographs are referred to the lists that have appeared in Bulletins 25 and 26 or they may address Mr. John W. Merrill, 40 Broad St., Boston, Mass. for this material. As fast as new negatives are added to those owned by the Society, they will appear in our bulletins.

Publications for 1932.

This leaflet is the first publication issued for 1932 and is being sent to all of our members to acquaint them with what the Society did during the past year and what we hope to accomplish in 1932.

The Publication Committee expect to have Bulletins No. 27 ready in March and this will cover the history of the Galena & Chicago Union R. R. This will be another special bulletin and is not included in the dues of the Annual Members.

Bulletin No. 28 will be ready some time in May and will contain some additional interesting notes on the Canadian Railroads. Bulletin No. 29 will be ready in November and will contain material which should be especially interesting to our Western and Pacific Coast members. Please report any changes of address to the Society in order that you will receive these bulletins promptly.

This is the eleventh of a series of leaflets containing the opening notices of our early railroads. Such members as have not a file of these and the booklet listing our exhibit in the Baker Library may have such copies as can be furnished upon application to Chas. E. Fisher, 6 Orkney Road, Brookline, Mass.

Our First Twenty-Six Bulletins.

The attention is again called to our members that the edition of several of our bulletins is now exhausted. We again urge you to procure such back numbers as you wish while the supply lasts. The following lists briefly the contents of such bulletins as are available:

Bulletins 1 and 2.

Out of Print.

Bulletin No. 3.

Story of the old Woburn Branch R. R.
Single Driving Wheel Locomotives.
Some Famous Runs and Some Famous Engines.
The Illinois Central System.
The Capture of the "General." (The Famous Engine on the Western & Atlantic R. R.)
The Maine Central and its Leased Lines.

Bulletin No. 4.

Boston's Old Depots.
Recollections of a retired Boston & Maine Engineer.
The Mount Washington R. R.
The Famous Color Trains of America.
The First Iron Passenger Cars.
Locomotives of the U. S. Military R. R. of the Civil War.

Bulletin No. 5.

Out of Print.

Bulletin No. 6.

Narrative of an Excursion on the Baltimore & Ohio Ry. (1832.)
List of Locomotives in the United States—1838.
Some Recollections—English Roads.
Locomotives Built at the Sacramento Shops.
Early Railroad Times—James H. French on the Old Colony R. R.

Bulletin No. 7.

Report of the Committee on Cars of the South Carolina Canal & Railroad Co.
Early Locomotive Building at Lowell, Mass.
The Old Iron Horses of the Central Pacific R. R.
Early Recollections—Louisville & Nashville R. R.
The Nova Scotia Engines.

Bulletin No. 8.

A Pioneer Locomotive Builder—M. W. Baldwin.
Locomotive Shops in the United States in 1855.
Some Railroad History of the Province of New Brunswick.
Early Engineering on the Houston & Texas Central R. R.
How "Locomotion No. 1" went to Wembley.
Recollections of the New York and Boston Express Line.
Old Colony Motive Power—Complete List.

Bulletins 9, 10 and 11.

Out of Print.

Bulletin No. 12.

Celebration of America's First Railway.
Missouri Pacific Celebration.
Locomotives at Purdue University.
Early Steam Railways in Great Britain.
Early Days of the Iron Horse in North Carolina.
The Brooks Locomotive Works.
Early Locomotives on the Maine Central R. R.
English Single Wheelers.
American Locomotives in Great Britain.
The New York and New Haven, Hartford & New Haven and Western (Mass.) Railroads.

Bulletin No. 13.

An exact reprint of the "Report upon Locomotive Engines and the Police and Management of the several and Principal Railroads in the Northern and Middle States" by J. Knight and Benj. H. Latrobe, Baltimore, 1838.

Bulletin No. 14.

Locomotives at Purdue University.
Early Scottish Locomotives of the 4-4-0 Design.
The Grand Trunk Railway of Canada.
History of the Schenectady Locomotive Works.

Bulletin No. 15.

The "Fair of the Iron Horse."
Famous Locomotives Still on Exhibition.
Locomotive Building at Taunton, Massachusetts.
First Locomotives in the State of Maine.
Extracts from some old New England Diaries.
The "Three Spot."
A Bury Engine on the Great Southern Railways of Ireland.
St. John and the Canadian Pacific Railway.
A Previous History of E. P. & S. W. No. 1 and Something of her Contemporaries on the St. Paul.
Notes on English Locomotives.
The Genesis of the Locomotive Truck.

Bulletin No. 16.

Historical Notes on Locomotive Design, 1769-1840.
The Cleveland, Columbus, Cincinnati & Indianapolis R. R. (History).
Recollections of G. A. Haggerty.
Locomotives on the New York & Erie R. R. (Roster of 1856 with additions).
Recollections of the Broad Gauge Line to Plymouth (England).
The Belfast and County Down Railway.

Bulletin No. 17.

Steam Tramways in the British Isles.
F. C. Winby's "James Toleman."
Dates of Some of the Principal Events in the History of 100 Years of the Railroad in New England.
Recollections of G. A. Haggerty.
Train Speeds and Safety in 1826.
The Beginning of the Southern Pacific R. R.
Historical Notes on Locomotive Design, 1840-1890.
The South Carolina Canal and Railroad.
Canadian Locomotive Practice in Early Days.
Notes on Northern Pacific R. R. Employees' Time Table No. 1.

Bulletin No. 18.

Canadian Locomotives of the Fifties. (Memories of the "Birkenheads").
Historical Notes on Locomotive Design, 1890-1913.
The New Castle Manufacturing Company.
The "Queen Empress" of the London & North-Western Ry.
The Leicester & Swannington Railway.
Other Days—Intercolonial Railway.
Recollections by G. A. Haggerty.
Errors of Railroad Management—1859.
Illinois Central R. R. Locomotive No. 640.
Old Bury type of Boiler Found on the Illinois Central R. R.
History of the "Best Friend of Charleston".
A Special Run made over the N. Y. C. & H. R. R. R. in 1891.
Replica of Colonel Stevens Locomotive.
Locomotive Rosters for our Members.

Bulletin No. 19.

Out of Print.

Bulletin No. 20.

Centenary of Rainhill, the "Rocket" and the "Stourbridge Lion".
The Stourbridge Lion Centennial.
The Rainhill Trials.
Early Tramroads in Great Britain.
Baltimore & Ohio R. R. Locomotive No. 600.
Account of a Trip over the Charleston & Hamburg R. R.—1833.
List of Early English Engines that Came to America.
The Atlantic City High Speed Line.
Pioneer Locomotives on the Pacific Coast.
Eastwick & Harrison's "Mercury".
Some Interest Letters of Levi L. Fletcher.
A Dream of Poughkeepsie. A Poem by John Loye.
Copy of Instructions Issued to John Floyd, Conductor of the First Train
from Walpole to Dedham, Mass., 1849.

Bulletin No. 21.

Brief History of the Philadelphia, Wilmington & Baltimore R. R. 1839-1881.

Bulletin No. 22.

The Genesis of the Western (Mass.) R. R.
Boston & Albany Railroad Locomotives—1832-1930.
Kinmond Brothers' Locomotive Works, Montreal.
The Montreal Ice Railway.
Incidents in English Railway History.
The Liverpool & Manchester Railway.
A Brief History of the New York & New England R. R.
The Little Locomotive with the Big Smokestack (Poem).
Chevalier de Gerstner.

Bulletin No. 23.

Locomotive Performance of Nearly One Hundred Years Ago.
The Canterbury & Whitstable Railway.
A Veteran Locomotive Still on the Job.
The Carillon & Grenville Railway.
The Nova Scotia Railway.
The History of the Grand Trunk Railway of Canada.

Bulletin No. 24.

Brief History of the Chicago, Burlington & Quincy R. R., 1855-1886.

Bulletin No. 25.

Theodore Dehone Judah.
The Hinkley Locomotive Works.
Boston, Hartford & Erie R. R. Locomotive No. 21.
Locomotives on the Grand Trunk Railway.
The Birmingham & Derby Jct. Ry.

Bulletin No. 26.

Locomotive Building at Manchester, New Hampshire.
The Locomotives of the Boston & Maine R. R. (Boston & Maine Group)
Pioneer Experience in Electric Traction and the New Haven R. R.
Some Notes Concerning Old Locomotive History.
Mineral Railways and Tramways in England.
Early Railroads in Virginia.

It was voted at the meeting of the Directors of this Society, held in January, 1930, that the price of all bulletins furnished to our members would be \$1.00 a copy. The price for non-members would be \$2.00 a copy. Back numbers may be procured, as long as the supply lasts, from Chas. E. Fisher, 6 Orkney Road, Brookline, Massachusetts.

Locomotive Rosters.

Since the list of Locomotive Rosters appeared in Bulletin No. 18, several more have been added to our file which may be of interest to our members. To the student of locomotive history there is nothing of more interest than a file of these rosters of your favorite road. Some of our early roads were very careful in the amount of details furnished while others did not enter into great detail in the matter. The name of the present owner or operating company is given in ()

Albany & West Stockbridge (B & A) 1856.
 Allegheny Portage (P R R) 1841, 1845.
 Allegheny Valley (P R R) 1870.
 Atchison, Topeka & Santa Fe R R 1877.
 Atlanta & Charlotte Air Line (Southern) 1879.
 Atlanta & West Point R R 1872, 1899.
 Atlantic & Gulf (A C L) 1864, 1874.
 Atlantic & North Carolina (N & W) 1857.
 Atlantic Coast Line of South Carolina (A C L) 1898.
 Atlantic, Mississippi & Ohio (N & W) 1871.
 Baltimore & Ohio R. R. 1848, 1850, 1856, 1860.
 Baltimore & Susquehanna (P R R) 1849, 1851.
 Bellfontaine Ry. (C C C & St. L) 1867.
 Bellfontaine & Indiana (C C C & St. L) 1854, 1856.
 Camden & Amboy (P R R) 1850, 1867.
 Camden & Atlantic (P R R) 1876.
 Cape Cod (N Y N H & H) 1853.
 Catawissa (P & R) 1860.
 Central Ohio (B & O) 1857.
 Central R R & Banking Co. of Georgia (C of Ga) 1843, 1853, 1858, 1863, 1874, 1881, 1894.
 Central R R of New Jersey 1864.
 Charleston & Western Carolina 1899.
 Charlotte & South Carolina (Southern) 1860.
 Charlotte, Columbia & Augusta (Southern) 1871.
 Chesapeake & Ohio R. R. 1868, 1871.
 Chicago & Alton (B & O) 1869.
 Chicago & North-Western Ry. 1872.
 Chicago, Burlington & Quincy R. R. 1858, 1870.
 Chicago, Milwaukee & St. Paul (C M St. P & P) 1882.
 Cincinnati, Hamilton & Dayton (B & O) 1855, 1861.
 Cincinnati, Indianapolis, St. Louis & Chicago (C C C & St. L) 1880, 1882.
 Cleveland & Pittsburgh (P R R) 1854.
 Cleveland & Toledo (N Y C) 1854, 1861.
 Cleveland, Columbus & Cincinnati and Cleveland, Painesville & Astabula
 Railroads Joint Report (C C C & St. L and N Y C) 1855.
 Columbia & Greenville (Southern) 1882.
 Columbus & Xenia (P R R) 1852.
 Covington & Lexington (L & N) 1855.
 Delaware, Lackawanna & Western R. R. 1856.
 East Tennessee & Virginia (Southern) 1865.
 East Tennessee, Virginia & Georgia (Southern) 1872.

Erie Ry. 1866.
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 Flint & Pere Marquette (P M) 1872.
 Galena & Chicago Union (C & N-W) 1857.
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 Grand Trunk (C N) 1859.
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 Hannibal & St. Joseph (C B & Q) 1863, 1872, 1876, 1877.
 Housatonic (N Y N H & H) 1856.
 Hudson River (N Y C) 1856.
 Indianapolis & Cincinnati (C C C & St. L) 1857, 1859.
 Indianapolis, Pittsburgh & Cleveland (C C C & St. L) 1859.
 Kansas City, St. Joseph & Council Bluffs (C B & Q) 1874.
 LaCrosse & Milwaukee (C M St. P & P) 1857, 1861.
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 Long Island (P R R) 1849, 1855, 1863.
 Lexington & Frankfort and Louisville & Frankfort (L & N) 1865.
 Louisville & Frankfort (L & N) 1852.
 Louisville & Nashville R. R. 1866, 1872, 1874, 1879.
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 Missouri, Kansas & Texas R. R. 1874.
 Missouri River, Ft. Scott & Gulf (St. L & S F) 1871.
 Mobile & Ohio (Southern) 1858.
 Mohawk & Hudson (N Y C) 1840.
 Montgomery & West Point (A & W Pt) 1859, 1860, 1861, 1862, 1863, 1864, 1866, 1867.
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 Petersburg (A C L) 1860, 1883.
 Philadelphia & Columbia (P R R) 1837, 1838, 1841, 1847.
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 Philadelphia, Germantown & Norristown (P & R) 1857, 1862, 1870.
 Philadelphia, Wilmington & Baltimore (P R R) 1851, 1861, 1881.
 Piedmont R. R. (Southern) 1864.
 Pittsburgh & Connellsville (B & O) 1868.
 Pittsburgh, Ft. Wayne & Chicago (P R R) 1858.
 Raleigh & Gaston (S A L) 1890.
 Richmond & Allegheny (C & O) 1882.
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 Rutland R. R. 1862, 1872.
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 Wilmington & Manchester (A C L) 1852, 1854, 1855, 1857, 1860.
 Wilmington & Weldon (A C L) 1866.

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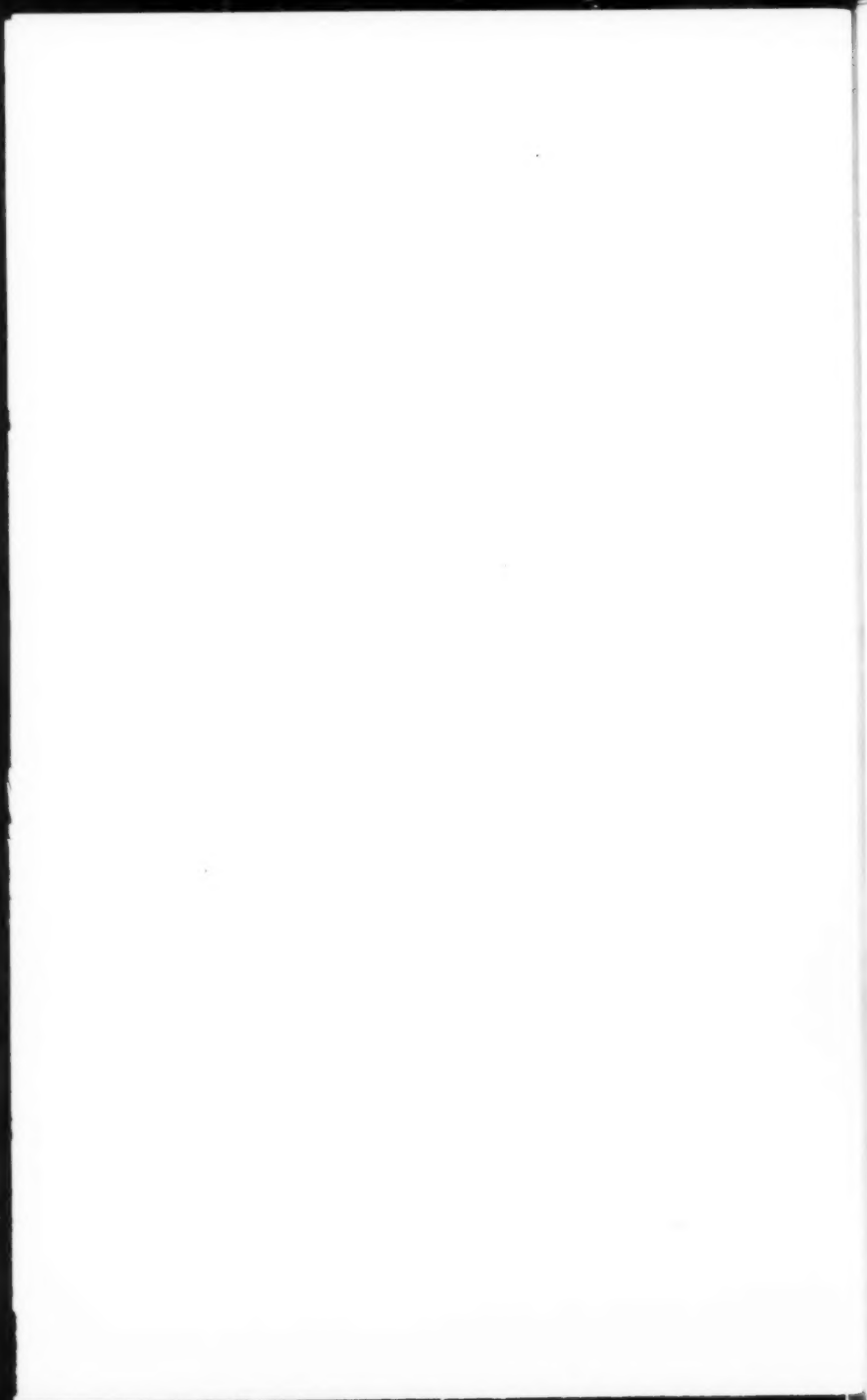
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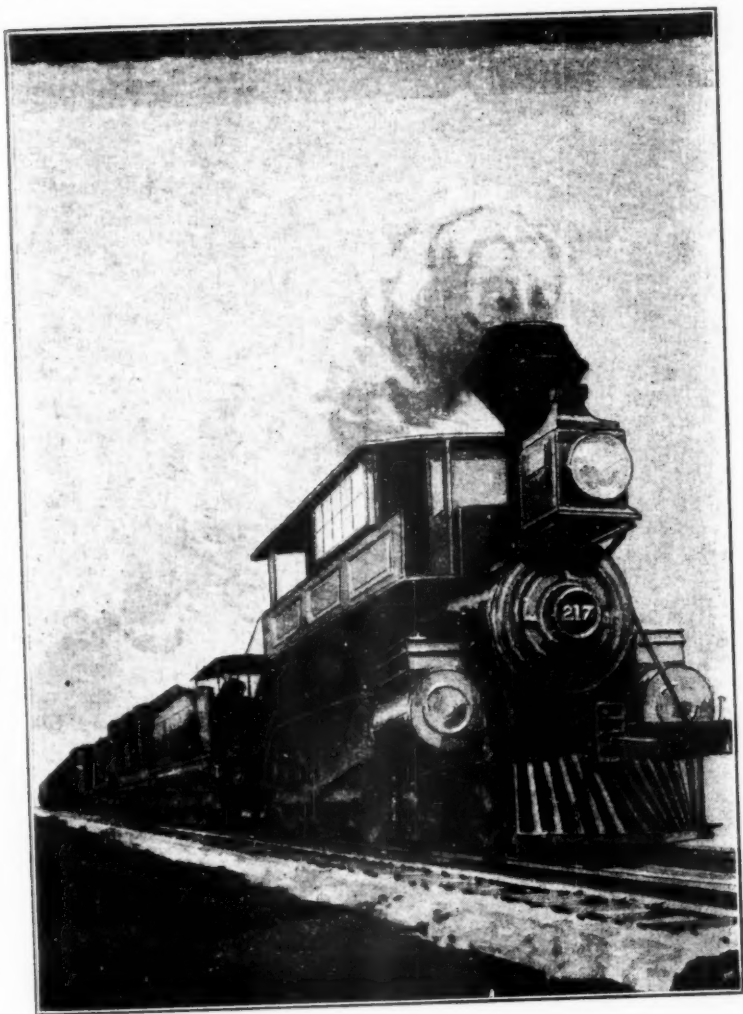
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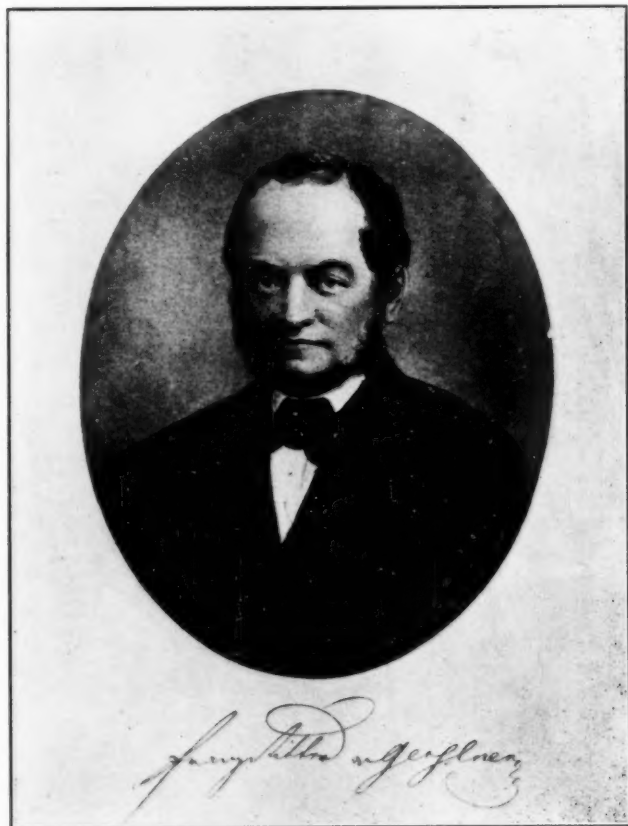


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BULLETIN No. 22



**The Railway and Locomotive
Historical Society**



CHEVALIER DE GERSTNER 1793-1840

BULLETIN No. 22

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THIS is the first bulletin issued for the current year containing the usual assortment of interesting articles from our own contributors. Bulletin No. 21, issued in March, devoted solely to the history of the Philadelphia, Wilmington & Baltimore R. R., was a special bulletin, in line with Bulletin No. 19 on the Michigan Central R. R. These special bulletins have been of no little interest to our members and to the public and have been very well received.

Turning to the contents of this issue, the possibilities of research for locomotive data, even at this late day, are represented in the list of Boston & Albany R. R. locomotives compiled by Mr. George Becker. It represents a tireless search for this material and the information given, we believe to be as accurate as can be found at this late day and also the first complete list of these locomotives ever printed. The account of the Ice Railway at Montreal and Kinmond Brothers' Locomotive Works also make interesting additions to our contributions. The brief history of the New York & New England R. R., by Commissioner George M. Woodruff, was the genesis of an idea of writing the history of the various railroads in the State of Connecticut. A pity that the idea was not carried farther than this single history!

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The Genesis of the Western R. R.

By H. A. FREEMAN

THE Revolutionary War left the colonies and the towns in the colonies very heavily in debt. A large part of the debt was owed abroad. To meet this obligation the Federal government imposed import duties and the various states and towns in the young republic levied direct taxes. Money being very scarce and not on a metal basis, it compelled our forefathers to rely largely on exports to raise the wherewithal to pay taxes at home and interest abroad. We were then an agricultural nation and our exports were largely foodstuffs. The soil in the seaboard states was diminishing in yield, and the virgin lands of the Allegheny western slopes and beyond were early to begin pouring their rivers of grain to the east. It was the necessity of setting these products down at seaboard at the lowest possible cost that stimulated the principal ports along the Atlantic coast to create economical arteries of transportation to the west.

The first successful achievement in this direction was the Erie Canal which wrested from Philadelphia its premier position and handed it to New York. Other similar projects such as the Baltimore & Ohio R. R. from Baltimore and the Phil. & Columbia and Allegheny Portage RRs and connecting canals from Philadelphia, soon followed.

Boston, though among the last to provide a western channel of trade to its doors, was among the first if not the very first to recognize the economic necessity of a trade route to its port and in 1792 a company was incorporated to build a canal between Boston Harbor and the Connecticut River. Due to the enormous public debt and prevailing poverty neither public nor private funds were obtainable and the idea abandoned. Thirty-three years later, or in February 1825, the state legislature appointed a commission to determine the feasibility of constructing a Canal from Boston to the Connecticut and to scheme out a means by which this artery of trade could be extended west across the Berkshires to the Hudson River. A careful study and survey showed the canal to be feasible, but the surmounting of the western hills was not so easy, and the matter again dropped. The use of a highway laid with rails was suggested at this time in an unofficial way, and in June 1827 a commission was appointed to survey for a railroad between Boston and the Hudson. Between then and the 29th of January 1828 the commission investigated the feasibility of two routes across the state, one crossing the Connecticut at Springfield, the other one crossing at Northampton. Some surveys were made only on the Springfield route as superficial consideration indicated this to be the cheaper to build, besides tapping the largest centers of population.

On this survey the most careful work was done between West Springfield and the state line. The commission found that a line could be built with a maximum grade of 80 ft. to the mile for a reasonable cost. From

data available to the commission it was decided to use as a basis of calculations, wagon loads of eight tons. This maximum gradient would require two horses per eight ton load, the grades of this severity being located together in a section about five miles long. Eight miles more of grade would be hard pulling for one horse per eight tons, but the remaining distance could be easily traversed with a single horse per load.

At this time too, the possibilities of way freight as a source of revenue were investigated, a few of the figures being quoted as follows, the rates being the current teaming rates from Boston:—Becket 270 tons per annum at an average cost of \$10 per ton, Chester 290 tons at \$20, Northampton 9,200 tons and Springfield 12,000 tons at \$18 per ton. It was estimated that the total way freight business for the entire route would be about 85,000 tons per annum.

Also as a possible source of additional revenue the transport of passengers was looked into. At this time the state was covered by a score or more turnpike companies which ran stages on highways constructed in most instances and maintained by them, and for the use of which the general public in vehicles of their own were charged toll, which was paid also by foot passengers and drovers. It was estimated that 30,000 people annually travelled by stage, which it was thought that would be even exceeded when the railroad was put through.

This report was laid over till January 1829 when additional data was obtained regarding the probable revenue of the road, and the costs of construction and service. It may be said in passing that practically all of the major trade routes later developing into trunk lines, were established originally only after a very painstaking and businesslike analysis of probable costs and revenue. And the afterward Boston & Albany R. R. was no exception to this. The January 1829 report estimated the total cost of the road at \$3,254,876.46, and the cost of freight transportation from Albany to Boston would be \$1.97 per ton. Through passengers could be transported from terminal to terminal in 22 hours at the cost of about \$3.00 each, based on full load of 20 passengers per car. Further investigation regarding existing passenger traffic showed that eighteen coaches made round trips between Boston and Albany weekly, carrying on the average 45 through and 30 way passengers.

To avoid the large outlay that English rails involved, a construction was recommended consisting of a stone wall extending from the surface of the ground to below frost line, on which was laid a stone slab a foot square in cross section and of convenient length with a bar of iron on top of this on which the carwheels ran. At this time the question of motive power was investigated and it was felt that due to the uncertainty of the commercial success of steam locomotives, and the high price of English coal and domestic coal, the latter being increased by expensive transportation that horses should be used. At this time it may be said, that the Stockton & Darlington was the only common carrier in the world using steam motive power, and the cost of power upkeep on this road was excessive.

The board or commission investigated the two routes before mentioned together with another having Troy for the western terminus.

The southern route was again given the preference, involving a change in level of 1500 ft. less than the better of the other two routes, beside traversing a more populous district.

This report, resulted in the early incorporation of the Boston & Worcester R. R., and in 1833 on the 15th of March in the chartering of the WESTERN RAILROAD CORPORATION, for the purpose of constructing a road from the terminus of the Boston & Worcester R. R. to the New York state line, with a capital of \$2,000,000. The first officers of the road were President, Thos. B. Wales, Treasurer, Josiah Quincy, Jr.; Clerk (or secretary), E. G. Loring, the organization and election of officers not taking place until 1836. Hardly had organization been completed when the officers appeared before the legislature to ask permission to incorporate a bank in Boston with a capital of \$5,000,000 which should contribute to the road for a period of 20 years the state bank tax. Instead of chartering this bank the legislature permitted the road to increase its R. R. capital to \$3,000,000 of which the state subscribed \$1,000,000.

Final surveys were begun in April 1836, and January 1837 contracts were let for 20 miles of road at the east end and commencing at Worcester. In July work was begun on the line between East Brookfield and Springfield, and in 1838 grading had been done on 27 miles, all done within estimate. Prior to this time, due to the success of steam power on the Liverpool & Manchester R. R. and various other lines it had been decided to adopt the locomotive as motive power.

Two installments of money due for stock subscribed were paid to the treasurer before work on the line was commenced, and the greater part of the third installment collected when the famous panic of 1837 hit the country. The fourth installment, due in April 1837 was postponed till September and then only 75% of the sum due was collected. The directors decided that unless they could get some form of state aid that they would suspend work. In February 1838 in answer to the request of the officers of the road, the legislature extended the credit of the state to the assistance of the road, by authorizing the issue of \$2,100,000, scrip afterwards increased to \$3,300,000 which sufficed to complete the road, up to a partial operating point.

On October 1, 1839 the road was opened to travel between Worcester and Springfield and on the 23d regular freight service commenced. Work of construction continued uninterrupted on the western end till money again ran out in 1841 when the legislature made them a grant of \$700,000 secured by mortgage, making the whole mortgage on the road to the state \$4,000,000.

In the meantime the New York State end of the road, the Albany and West Stockbridge R. R. was in process of construction. It was not completed however when the Western R. R. was opened for business. Opening of the road was not delayed thereby for Western R. R. trains were operated till its completion, over the track of the Hudson & Berkshire R. R. which had been completed to Hudson, N. Y. in 1838.

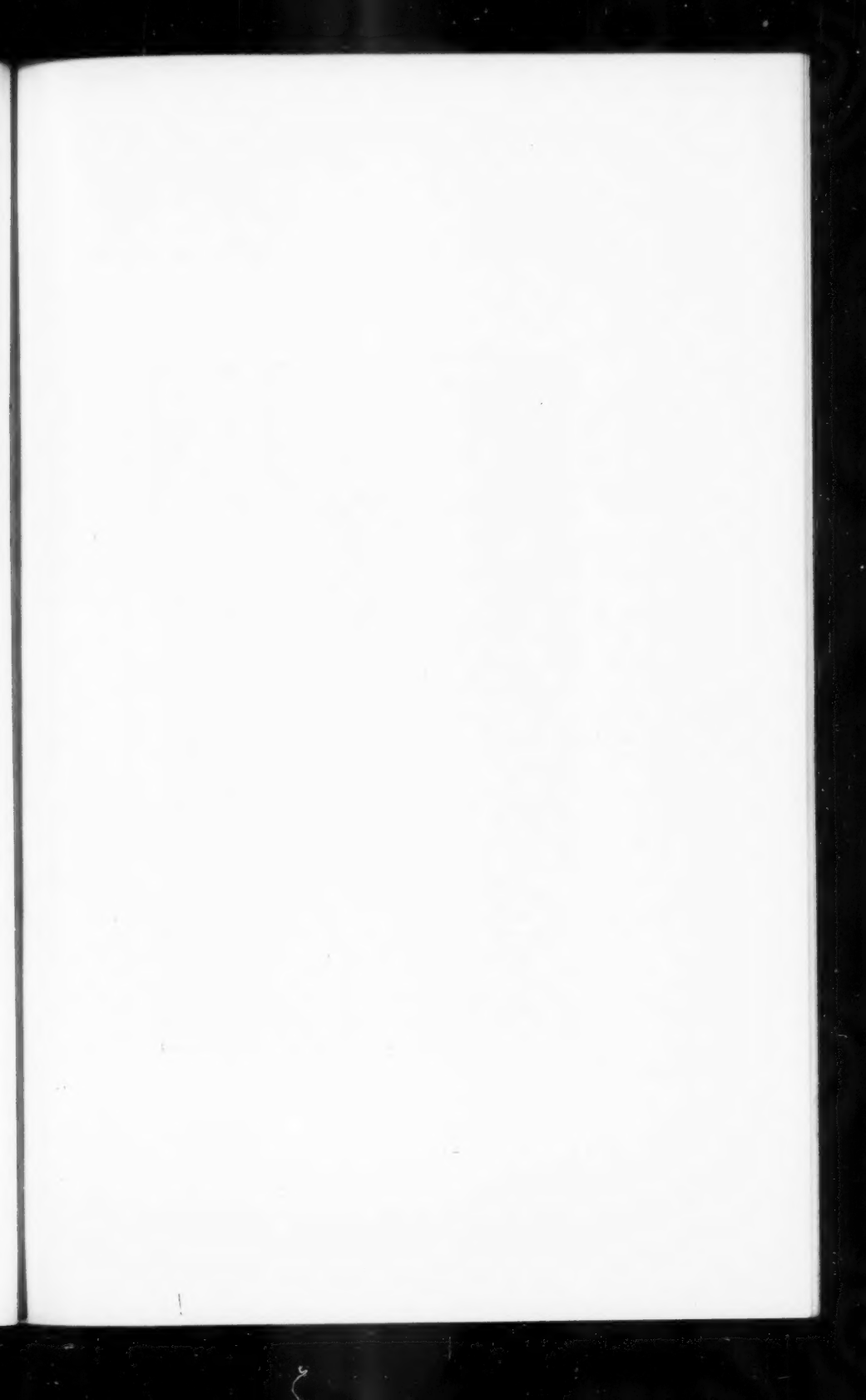
On December 21, 1841 the Western R. R. commenced operation in its entirety. Its total cost was \$5,814,817.52, or with the Albany & West

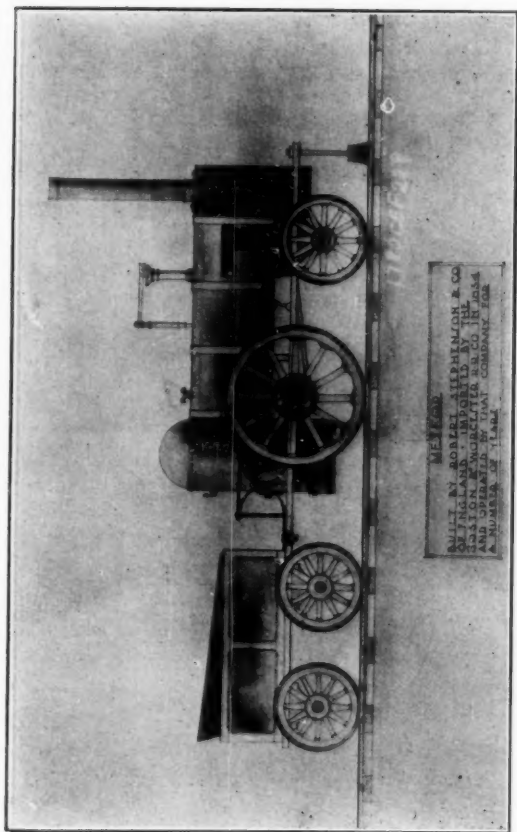
Stockbridge \$7,566,791.57. In its opening year 1842 it carried 190,436 passengers and 39,820 tons of freight.

The road as projected and built was well conceived and well constructed. With an eye to future business cuts and fills were made wide enough for double track, as well as were the smaller bridges and culverts. The Connecticut River was crossed by a wooden Howe truss bridge of seven spans, the total length of which was 1,264 feet.

Details of the motive power are outside the scope of this article but it may be said that the earliest engines were of rigid frame planet type, several being built in 1835 by the Lowell Locks & Canals. Cars, freight and passenger, were small four-wheel affairs.

For the information used in this article, I am indebted to the archives of the Department of State of the Commonwealth of Massachusetts, Public Acts of Massachusetts, various files of Boston and Springfield newspapers, and various local histories, conspicuous among the latter Holland's History of Western Massachusetts.





B. & W. "METEOR"—FROM A DRAWING FOUND IN AN OLD B. & W. RECORD BOOK.

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Boston and Albany Locomotives

1832-1930

By GEO. P. BECKER AND CHAS. E. FISHER

The following list of locomotives was compiled after careful study of all authentic records which are now available, such as lists published from time to time in the Director's reports, Builder's records, and classification books issued by the Boston and Albany Railroad. To state that the list is absolutely correct in every detail would be folly, as it would be impossible, at this time, to either prove or disprove such a statement. There may be an early locomotive omitted or perhaps a double listing of one or more if the name was changed and was listed as a separate locomotive under each name. These cases may be regarded as few and the list about 98% correct which is as nearly correct as it is possible to make it at this time from available records.

A name appearing on an early record and not on later ones would indicate that the locomotive was either renamed, or after it was retired from service the name was not assigned to its successor. There is evidence that the original "Lion" on the Boston and Worcester was renamed "Brookline" and the "Despatch" on the same road carried the name of the "Prince of Wales" while that distinguished person was in this country in 1860. With these two instances on record it is not unreasonable to assume that it may have been done in a few other cases.

Therefore, in making up this list, in order that no name found on any list or record would be omitted, all names which could not be traced through to the later lists, are included as near as possible to other locomotives built about the same date but with no apparent connection with any of these or other later locomotives. Where there are two or more locomotives of the same name it does not always indicate that the first one remained in service until the second one was built.

The locomotive "Yankee" built at Mill Dam Foundry, Boston, and delivered to the Boston and Worcester Railroad July 3rd, 1834 was the first locomotive built in New England.

All locomotives built prior to the consolidation in 1867, with numbers up to and including number 109 were built for or by the Western Railroad and those built prior to that date with numbers 110 and above were built for or by the Boston and Worcester Railroad.

Name	Numbers Orig. New	Builder	Build	Type	Cyl.	Drvs.	N. Y. C. Nos. 1st. 2nd.	B. & A. 1913 No.
Barnstable	—	Locks & Canals	1835	2-2-0	—	—	—	—
Dukes	—	" "	1836	2-2-0	—	—	—	—
Essex	—	" "	1836	2-2-0	—	—	—	—
New York	—	" "	1842	4-2-0	—	—	—	—
New York	1	B. & A.	1867	4-4-0	16x26	50	—	—
—	1	B. & A.	1884	4-4-0	20x26	54	715	—
Rhode Island	—	Locks & Canals	1842	4-2-0	—	—	—	—
Rhode Island	2	B. & A.	1868	4-4-0	16x26	60	—	—
—	2	" "	1891	0-4-0	16x24	48	84	—
New Jersey)	—	Hinkley	1847	4-4-0	16x20	54	—	—
Fulton	3	B. & A.	1876	0-4-0	14x24	48	—	—
Fulton	—	Sch. L. W.	1899	0-6-0	19x29x26	48	396	106
Massachusetts)	—	Locks & Canals	1842	4-2-0	—	—	—	106
Euxine	4	B. & A.	1875	4-4-0	18x26	60	—	—
Euxine	4	Hinkley	1891	4-4-0	18x26	66	1219	—
Vermont)	—	Hinkley	1846	4-4-0	18x20	54	—	—
Adriatic	5	B. & A.	1873	4-4-0	17x26	54	—	—
Adriatic	5	" "	1892	4-4-0	18x22	60	1207	218
Connecticut	—	Hinkley	1846	4-4-0	15x20	54	—	—
Connecticut	6	B. & A.	1873	4-4-0	17x26	54	—	—
—	6	" "	1891	4-4-0	18x22	60	1182	220
Florida	—	Hinkley	1848	4-4-0	14x18	56	—	—
Florida	7	B. & A.	1878	4-4-0	18x28	54	—	—
—	7	" "	1892	4-4-0	18x22	60	1184	222-214
Kentucky	—	Hinkley	1846	4-4-0	16x20	54	—	—
Kentucky	8	" "	1876	4-4-0	18x26	60	—	—
Tennessee	—	Sch. L. W.	1895	2-8-0	20x26	48	2510	946
Tennessee	63	Hinkley	1846	4-4-0	16x20	54	—	—
—	—	" "	1878	4-4-0	18x28	54	—	—
Buffalo	50	B. & A.	1895	2-8-0	20x26	48	2506	942
Buffalo	50	Sch. L. W.	1847	4-4-0	16x20	60	—	—
Vermont	10	Hinkley	1871	4-4-0	16x26	60	—	—
Vermont	10	B. & A.	1890	2-8-0	20x26	48	2533	905
Virginia	61	Baldwin	1890	2-8-0	20x26	48	—	—
—	11	Hinkley	1846	4-4-0	16x20	54	—	—
—	11	B. & A.	1876	4-4-0	18x26	60	—	—
—	11	R. I. L. W.	1893	4-6-0	20x26	66	Later No. 163	—

Name	Numbers Orig. Nos.	Builder	Built	Type	Crk.	Days	N. Y. C. Nos. 1st. 2nd.	B. & A. Nos. 1st. 2nd.
Indianapolis	—	Sch. L. W.	1900	4-4-0	20x26	75	—	—
Trojan	—	Hinkley	1848	4-4-0	18x20	60	—	—
—	12	B. & A.	1871	0-4-0	18x22	48	—	—
Bristol	12	R. I. L. W.	1893	4-6-0	20x24	66	Later No. 164	250
Bristol	286	Sch. L. W.	1835	2-2-0	20x26	75	1140	—
—	—	Hinkley	1848	4-4-0	—	—	—	—
—	13	B. & A.	1869	4-4-0	15x20	60	—	—
—	13	R. I. L. W.	1891	0-4-0	18x24	48	—	—
St. Louis	—	Hinkley	1843	4-4-0	13 1/2 x 20	60	87	—
Agawam	14	"	1871	0-4-0	15x22	48	—	—
—	14	B. & A.	1890	0-4-0	18x24	48	88	—
Chicago) Beebe)	—	Hinkley	1848	4-4-0	18x20	60	—	—
Beebe	15	B. & A.	1876	4-4-0	18x22	66	—	—
—	15	R. I. L. W.	1891	2-8-0	20x26	48	2569	939
Columbus	—	Hinkley	1848	4-4-0	18x20	60	—	—
—	16	B. & A.	1871	4-4-0	18x26	60	—	—
Delaware	—	Hinkley	1847	4-4-0	18x20	54	—	—
—	17	B. & A.	1870	4-4-0	18x26	60	—	—
—	17	R. I. L. W.	1891	0-4-0	18x24	48	89	—
Detroit	—	Hinkley	1847	4-4-0	18x20	60	—	—
—	18	R. I. L. W.	1869	0-4-0	18x24	48	—	—
Detroit	18	B. & A.	1881	4-4-0	18x26	54	—	—
Georgia	—	Hinkley	1848	4-4-0	18x20	60	—	—
—	19	R. I. L. W.	1893	4-4-0	19x26	66	1165	—
Franklin	—	Locks & Canals	1840	4-2-0	—	—	—	—
Franklin	—	Hinkley	1848	4-4-0	16x20	66	—	—
—	20	B. & A.	1868	4-4-0	18x26	60	—	—
Iowa	20	R. I. L. W.	1893	4-4-0	19x26	66	1167	—
Iowa	21	Hinkley	1847	4-4-0	16x20	54	—	—
—	21	B. & A.	1870	4-4-0	16x26	60	—	—
Louisiana	—	Sch. L. W.	1895	4-4-0	20x24	66	1148	225
Louisiana	—	Hinkley	1847	4-4-0	16x20	54	—	—
—	22	B. & A.	1874	4-4-0	18x26	60	—	—
—	22	R. I. L. W.	1893	0-6-0	19x24	48	390	104
Louisville	—	Hinkley	1848	4-4-0	16x20	60	—	—
—	23	B. & A.	1869	4-4-0	16x26	60	—	—
—	23	"	1885	4-4-0	20x26	54	718	—

Name	Numbers Orig. New	Builder	Built	Type	Cyl.	Drva.	N. Y. C. Nos. 1st. 2nd.	B. & A. 1912 No.
Maine	24	Hinkley	1846	4-4-0	16x20	54	—	—
Maine	24	B. & A.	1870	4-4-0	16x26	60	—	—
Mississippi	24	R. I. L. W.	1891	0-4-0	16x24	48	91	—
Mississippi	25	Hinkley	1847	4-4-0	16x20	54	—	—
Mississippi	25	B. & A.	1869	4-4-0	16x26	60	—	—
Montreal)	25	Hinkley	1886	4-4-0	20x26	54	724	—
Shaker)	26	Hinkley	1848	4-4-0	16x20	60	—	—
Shaker	26	B. & A.	1878	4-4-0	18x22	72	—	—
Nashville	27	R. I. L. W.	1893	4-4-0	19x24	66	1166	204
Nashville	27	Hinkley	1848	4-4-0	16x20	60	—	—
Nashville	27	B. & A.	1877	4-4-0	18x26	54	—	—
New England	27	R. I. L. W.	1893	4-4-0	19x24	66	1168	—
New England	28	Hinkley	1848	4-4-0	16x20	56	—	—
New England	28	B. & A.	1870	4-4-0	16x26	60	—	—
Hampshire	28	R. I. L. W.	1891	0-4-0	16x24	48	94	—
Hampshire	29	Locks & Canals	1840	4-2-0	—	—	—	—
Hampshire	29	Hinkley	1848	4-4-0	16x20	56	—	—
Hampshire	29	B. & A.	1870	4-4-0	16x26	60	—	—
Boston	29	Sch. L. W.	1895	4-4-0	20x24	66	1146	227
New Jersey	30	Hinkley	1843	0-4-0	15x20	48	Later 0-4-2	—
New Jersey	30	B. & A.	1868	4-4-0	16x26	60	—	—
New Orleans	30	"	1885	4-4-0	20x26	54	728	—
New Orleans	31	Hinkley	1848	4-4-0	16x20	60	—	—
New Orleans	31	B. & A.	1867	4-4-0	16x26	60	—	—
Philadelphia	31	"	1887	4-4-0	16x24	48	95	—
Barnes	32	Norris	1852	—	—	—	—	—
Pennsylvania	32	B. & A.	1877	4-4-0	18x22	66	—	—
Pennsylvania	32	Sch. L. W.	1894	4-4-0	19x24	66	1159	229
Pennsylvania	33	Hinkley	1847	4-4-0	16x20	54	—	—
Pennsylvania	33	B. & A.	1869	4-4-0	16x26	60	—	—
No. Carolina)	33	R. I. L. W.	1891	0-4-0	16x24	48	97	—
Richmond)	33	Hinkley	1847	4-4-0	16x20	54	—	—
Richmond	34	B. & A.	1867	4-4-0	16x26	60	—	—
So. Carolina	34	"	1887	4-4-0	20x26	54	729	—
So. Carolina	35	Hinkley	1847	4-4-0	16x20	54	—	—
So. Carolina	35	B. & A.	1874	4-4-0	18x26	60	—	—
—	35	R. I. L. W.	1891	2-8-0	20x26	48	2567 2501	937

Name	Numbers Orig. New	Builder	Built	Type	Cyl.	Drva.	N. Y. C. Nos. 1st. 2nd.	B. & A. 1912 No.
Wisconsin	—	Hinkley	1847	4-4-0	16x20	54	—	—

Name	Numbers Ordn. New	Builder	Balls	Type	Crh.	Dvys.	N. Y. C. Nos. 1st. 2nd.	B. & A. 1912 No.
Wisconsin	36	Hinkley	1847	4-4-0	18x20	54	—	—
Wisconsin	35	B. & A.	1874	4-4-0	18x26	60	—	219
Middlefield	37	"	1891	4-4-0	18x22	60	1179	—
—	37	R. I. L. W.	1871	4-4-0	16x24	48	99	89
Erle	37	Taunton	1891	0-4-0	16x20	54	—	—
—	38	B. & A.	1848	4-4-0	16x20	54	—	—
—	38	"	1870	4-4-0	16x26	60	—	—
Champton	38	Taunton	1889	4-4-0	18x22	60	1180	212
Marmora	39	B. & A.	1848	4-4-0	16x20	54	—	—
—	39	B. & A.	1876	4-4-0	18x26	60	—	—
St. Lawrence	39	R. I. L. W.	1891	2-8-0	20x26	48	2568	938
Howard	40	Taunton	1848	4-4-0	16x20	54	—	—
Providence	40	B. & A.	1876	4-4-0	18x24	72	—	—
Providence	41	Taunton	1848	4-4-0	16x20	60	—	—
—	41	B. & A.	1871	4-4-0	16x26	60	—	—
St. Clair	41	"	1887	4-4-0	20x26	54	723	—
St. Clair	42	Taunton	1848	4-4-0	16x20	54	—	—
—	42	B. & A.	1872	4-4-0	18x22	54	—	—
Niagara	42	"	1891	4-4-0	18x22	66	1188	—
Palmer	43	Taunton	1848	4-4-0	16x20	54	—	—
—	43	B. & A.	1869	4-4-0	16x26	60	—	—
Greylock)	43	"	1886	4-4-0	20x26	54	733	—
Tobey)	43	Hinkley	1847	4-4-0	14x18	60	—	—
Tobey	44	B. & A.	1876	4-4-0	18x22	66	—	—
—	44	R. I. L. W.	1893	0-6-0	19x24	48	387	101
Gilmore	44	Western R. R.	1851	4-4-0	15% x 26	72	As Rebuilt	—
Gilmore	45	B. & A.	1879	4-4-0	18x22	72	—	—
—	45	"	1891	4-4-0	18x22	60	1176	217
Whistler	45	Western R. R.	1852	4-4-0	15% x 26	72	—	—
Whistler	46	B. & A.	1881	4-4-0	18x24	72	—	—
—	46	Sch. L. W.	1895	4-4-0	19x24	66	1160	235
Wales	47	Western R. R.	1854	4-4-0	16% x 22	72	—	—
Wales	47	B. & A.	1883	4-4-0	17x26	54	759	—
Apollo	47	Mason	1855	4-4-0	15x22	72	—	—
Casplan	48	B. & A.	1873	4-4-0	17x26	54	—	—
—	48	B. & A. W.	1892	4-4-0	20x26	54	735	—
Nevada	48	Mason	1855	4-4-0	15x22	72	—	—
Nevada	49	B. & A.	1882	4-4-0	20x26	54	757	—

Name	Numbers Orig. New	Builder	Built	Type	Cyl.	Drvs.	N. Y. C. Nos. 1st. 2nd.	B. & A. 1912 No.
Olympus	—	Mason	1855	4-4-0	15x22	72	—	—
Olympus	50	B. & A.	1880	4-4-0	18 $\frac{3}{4}$ x28	54	—	—
Panama	—	Mason	1855	4-4-0	15x22	72	—	—
—	51	B. & A.	1883	4-4-0	20x26	72	754	—
Saranak	—	Mason	1855	4-4-0	15x22	72	—	—
—	52	B. & A.	1883	4-4-0	20x26	54	755	—
Sonora	—	Mason	1855	4-4-0	15x22	72	—	—
—	53	B. & A.	1883	4-4-0	20x26	54	756	—
California	—	Lowell Mach.	1853	4-4-0	15x22	54	—	—
California	—	B. & A.	1868	4-4-0	15x26	60	—	—
—	54	—	1886	4-4-0	18x22	66	1187	207
Oregon	—	Lowell Mach.	1853	4-4-0	15x22	54	—	—
—	55	B. & A.	1873	4-4-0	17x26	54	—	—
Oregon	55	R. I. L. W.	1893	0-6-0	19x24	48	386	100
Texas	—	Lowell Mach.	1853	4-4-0	15x22	54	—	—
—	56	R. I. L. W.	1869	0-4-0	16x24	48	—	—
—	56	B. & A.	1888	4-4-0	18x22	66	1193	—
Cleveland	—	Lowell Mach.	1853	4-4-0	18x22	66	—	—
—	57	B. & A.	1870	4-4-0	15x26	60	—	—
—	257	R. I. L. W.	1872	4-4-0	17x24	60	Orig. No. 211.	—
Waterman)	—	Manchester	—	—	—	—	—	—
Chesapeake	58	B. & A. R. R.	1880	4-4-0	18 $\frac{3}{4}$ x28	54	—	—
—	58	R. I. L. W.	1893	0-6-0	19x24	48	388	102
G. C. Alogz)	—	Spfld L. W.	1858	—	—	—	—	—
Alger	59	B. & A.	1879	4-4-0	15x26	60	—	—
Switcher	—	—	—	—	—	—	—	—
Pusher	60	Hinkley	1871	0-4-0	15x22	48	—	—
—	60	B. & A.	1891	4-4-0	18x22	60	1195	221
—	—	Taunton	1854	4-4-0	16x20	72	—	—
San Francisco)	—	—	—	—	—	—	—	—
H. M. Holbrook)	61	B. & A.	1877	4-4-0	18x24	72	—	—
Cummings	—	Sch. L. W.	1896	4-4-0	20x24	66	1145	226
—	206	Ross Winans	1842	0-8-0	—	—	—	—
Albany	—	Bemis & Co.	1857	4-4-0	—	—	—	—
Albany	62	B. & A.	1873	4-4-0	17x26	54	—	—
—	62	Sch. L. W.	1894	2-8-0	20x26	48	2509	945
United States	—	Baldwin	1844	0-6-0	16 $\frac{1}{2}$ x18	46	—	—

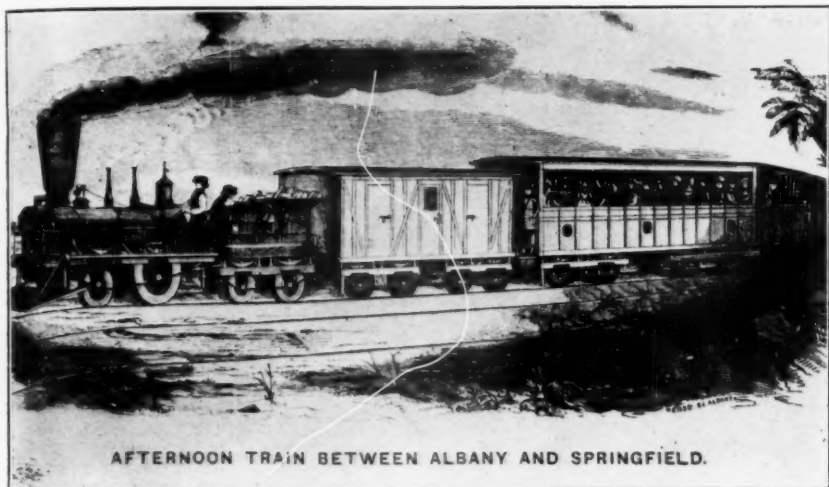
Name	Numbers Orig. New	Builder	Built	Type	Cyl.	Drvs.	N. Y. C. Nos. 1st. 2nd.	B. & A. 1912 No.
Biles	63	Western R. R.	1857	4-4-0	15 $\frac{1}{2}$ x26	72	—	—

Name	Numbers Orig. New	Builder	Ballt	Type	Cub.	Days.	N. Y. C. Nos. 1st. 2nd.	B. & A. 1912 No.
Biles	63	Western R. R.	1857	4-4-0	15 1/2 x 26	72	—	—
Pacific	63	B. & A.	1882	4-4-0	18 x 26	60	1223	—
Baltic	64	Baldwin	1844	0-6-0	16 1/2 x 18	46	—	—
Atlantic	64	Spfld L. W.	1857	4-4-0	16 x 26	60	—	—
Atlantic	64	R. I. L. W.	1891	2-8-0	20 x 26	48	2566	936
Atlantic	65	Baldwin	1844	0-6-0	16 1/2 x 18	46	—	—
Atlantic	65	Spfld L. W.	1857	4-4-0	16 x 26	60	—	—
Ontario	65	B. & A.	1886	4-4-0	20 x 26	54	716	—
Ontario	65	Taunton	1848	4-4-0	14 x 18	60	—	—
Champlain	66	Western R. R.	1859	4-4-0	16 x 26	60	—	—
Champlain	66	Baldwin	1891	2-8-0	20 x 26	48	2535	907
Superior	67	Western R. R.	1859	4-4-0	16 x 26	60	—	—
Superior	67	B. L. W.	1891	2-8-0	20 x 26	48	2635	907
Swift	68	Western R. R.	1858	4-4-0	16 1/2 x 22	72	—	—
Swift	68	B. & A.	1884	4-4-0	20 x 26	54	717	—
Augusta	68	Taunton	1848	4-4-0	16 x 20	54	—	—
Dwight	69	Western R. R.	1860	4-4-0	16 1/2 x 22	72	—	—
Dwight	69	B. & A.	1883	0-4-0	14 x 24	48	102	—
Cincinnati	70	Hinkley	1843	4-4-0	13 1/2 x 20	60	—	—
Massachusetts	70	Western R. R.	1861	4-4-0	16 x 26	60	—	—
Massachusetts	70	Baldwin	1891	2-8-0	20 x 26	48	2536	908
Huron	71	Western R. R.	1862	4-4-0	16 x 26	60	—	—
Huron	71	Western R. R.	1891	2-8-0	20 x 26	48	2537	909
Henry Gray	72	Western R. R.	1858	4-4-0	16 x 26	60	—	—
Henry Gray	72	B. & A.	1885	0-4-0	16 x 24	48	92	—
Alabama	73	Hinkley	1848	4-4-0	16 x 20	56	—	—
Alabama	73	Western R. R.	1864	4-4-0	16 1/2 x 22	72	719	—
Chapin	73	B. & A.	1884	4-4-0	20 x 26	54	—	—
Springfield	74	Hinkley	1845	4-4-0	13 1/2 x 20	60	—	—
Springfield	74	Western R. R.	1866	4-4-0	16 1/2 x 22	72	—	—
Springfield	74	B. & A.	1883	4-4-0	20 x 26	54	720	—
Worcester	75	Locks & Canals	1841	4-2-0	—	—	—	—
Worcester	75	Western R. R.	1865	4-4-0	16 1/2 x 22	72	—	—
Worcester	75	B. & A.	1884	4-4-0	20 x 26	54	721	—
Pittsfield	76	Hinkley	1846	4-4-0	13 1/2 x 20	60	—	—
Pittsfield	76	Western R. R.	1865	4-4-0	16 x 26	60	—	—
Pittsfield	76	Baldwin	1888	2-8-0	20 x 26	48	2539	911
Nantucket	—	Locks & Canals	1840	4-2-0	—	—	—	—
Nantucket	—	Taunton	1848	4-4-0	16 x 20	54	—	—

Name	Numbers Orig. New	Builder	Built	Type	Cyl.	Drva.	N. Y. C. Nos. 1st. 2nd.	R. & A. 1012 No.
Nantucket	77	Western R. R.	1863	4-4-0	16x26	60	—	—
—	77	Baldwin	1888	2-8-0	20x26	48	2540	912
Minnesota	78	Western R. R.	1866	4-4-0	16x26	60	—	—
—	78	Baldwin	1890	2-8-0	20x26	48	2541	913
Colorado	79	Western R. R.	1866	4-4-0	16x26	60	—	—
—	79	Baldwin	1890	2-8-0	20x26	48	2542	914
Concord	—	Taunton	1848	4-4-0	16x20	54	—	—
Concord	80	Western R. R.	1866	4-4-0	16x26	60	—	—
—	80	Baldwin	1890	2-8-0	20x26	48	2543	915
Montana	81	Western R. R.	1866	4-4-0	16x26	60	—	—
—	81	B. & A.	1886	4-4-0	20x26	54	722	—
Dacotah	82	Western R. R.	1866	4-4-0	16x26	60	—	—
—	82	Baldwin	1890	2-8-0	20x26	48	2544	916
Arizona	83	Western R. R.	1866	4-4-0	16x26	60	—	—
—	83	B. & A.	1880	4-4-0	18 3/4 x 28	54	—	—
Greenbush	84	Sch. L. W.	1894	2-8-0	20x26	48	2511	947
—	84	Mason	1866	4-4-0	16x24	60	—	—
Chatham	85	Baldwin	1888	2-8-0	20x26	48	2545	917
—	85	Mason	1866	4-4-0	16x24	60	—	—
G. H. Power	86	Baldwin	1888	2-8-0	20x26	48	2546	918
—	86	Taunton	1866	4-4-0	16x24	60	—	—
Hudson	87	B. & A.	1882	4-4-0	18x26	60	—	—
—	87	Taunton	1866	4-4-0	16x24	60	—	—
Idaho	88	B. & A.	1883	4-4-0	18x22	66	1169	—
—	88	Western R. R.	1866	4-4-0	16x26	60	—	—
Nebraska	89	Baldwin	1890	2-8-0	20x26	48	2547	919
—	89	Western R. R.	1866	4-4-0	16x26	60	—	—
Michigan	90	Baldwin	1890	2-8-0	20x26	48	2548	920
—	90	Ross Winans	1842	0-8-0	—	—	—	—
Maryland	91	Western R. R.	1867	4-4-0	16x26	60	2549	921
—	91	B. & A.	1887	4-4-0	—	—	—	—
Sampson	92	Hinkley	1867	4-4-0	18x22	66	1175	209
—	92	B. & A.	1888	0-4-0	16x24	48	98	—
Goliath	93	Hinkley	1867	0-4-0	15x22	48	—	—
—	93	R. I. L. W.	1891	0-4-0	16x24	48	101	83
Ohio	—	Ross Winans	1842	0-8-0	—	—	—	—

Name	Numbers Orig. New	Builder	Built	Type	Cyl.	Drvs.	N. Y. C. Nos. 1st. 2nd.	R. & A. 1912 No.
Ohio	94	Hinkley	1867	4-4-0	16x24	60	—	—
—	94	B. & A.	1886	4-4-0	18x22	66	1190	—
Illinois	95	Ross Winans	1842	0-8-0	—	—	—	—
Illinois	95	Hinkley	1867	4-4-0	16x24	60	—	—
Missouri	96	B. & A.	1886	4-4-0	18x22	66	1194	205-207
Missouri	96	Ross Winans	1842	0-8-0	—	—	—	—
—	96	Western R. R.	1867	4-4-0	16x26	60	—	—
Indiana	96	B. & A.	1890	4-4-0	18x22	66	1171	213
Indiana	97	Ross Winans	1842	0-8-0	—	—	—	—
Indiana	97	Western R. R.	1867	4-4-0	16x26	60	—	—
Indiana	97	B. & A.	1878	4-4-0	18x26	60	—	—
—	97	R. I. L. W.	1893	0-6-0	19x24	48	391	105
Arkansas	98	Ross Winans	1842	0-8-0	—	—	—	—
Arkansas	98	Western R. R.	1867	4-4-0	16x26	60	—	—
—	98	Western R. R.	1842	0-8-0	—	—	—	—
Alaska	99	R. I. L. W.	1891	0-4-0	16x24	48	85	—
—	99	Western R. R.	1867	4-4-0	16x26	60	—	—
Suffolk	100	R. I. L. W.	1891	0-4-0	16x24	48	—	—
Suffolk	100	Locks & Canals	1841	4-2-0	—	—	—	—
—	100	Grant L. W.	1867	4-4-0	16x24	66	—	—
Middlesex	100	B. & A.	1883	4-4-0	20x26	54	726	—
Middlesex	101	Locks & Canals	1840	4-2-0	—	—	—	—
—	101	Grant L. W.	1867	4-4-0	16x24	66	—	—
—	101	B. & A.	1884	4-4-0	18x22	66	1208	—
Hampden	102	Locks & Canals	1840	4-2-0	—	—	—	—
Hampden	102	Grant L. W.	1867	4-4-0	16x24	66	—	—
—	102	B. & A.	1884	4-4-0	18x22	66	1191	—
Berkshire	103	Locks & Canals	1836	2-2-0	—	—	—	—
Berkshire	103	Grant L. W.	1867	4-4-0	16x24	66	—	—
—	103	Locks & Canals	1840	4-4-0	18x22	66	—	—
Putnam	104	B. & A.	1868	4-4-0	16x26	60	—	—
—	104	—	1884	4-4-0	20x26	48	2553	925
Washington	104	Baldwin	1891	2-8-0	13 1/2 x 20	60	—	—
Washington	105	Hinkley	1846	4-4-0	16x26	60	—	—
—	105	B. & A.	1868	4-4-0	20x26	48	2554	926
Plymouth	105	Baldwin	1891	2-8-0	—	—	—	—
Plymouth	106	Locks & Canals	1841	4-2-0	—	—	—	—
—	106	B. & A.	1868	4-4-0	16x26	66	—	—
Norfolk	106	—	1885	4-4-0	20x26	54	727	—
Norfolk	107	Locks & Canals	1841	4-2-0	—	—	—	—
Norfolk	107	B. & A.	1868	4-4-0	16 3/4 x 22	66	—	—

Name	Numbers Orig. New	Builder	Type	Cyl.	Dvcs.	N. Y. C. Nos. 1st. 2nd.	R. & A. 1st. 2nd.
Wyoming	108 16	R. I. L. W.	0-6-0	19x24	48	—	103
—	108	B. & A.	4-4-0	16x26	60	—	928
—	108	Baldwin	2-8-0	20x26	48	2556	—
Brookfield	109	B. & A. W.	4-4-0	16x26	60	1147	224
—	209	Sch. L. W.	4-4-0	20x24	66	—	—
Ajax	—	Hinkley	4-4-0	15x20	54	—	—
—	110	B. & A.	4-4-0	16x22	60	1196	—
—	110	B. & A.	4-4-0	18x22	66	—	—
—	111	Hinkley	4-4-0	15x20	54	—	—
Hercules	111	Hinkley	4-4-0	18x26	60	—	—
Hercules	111	B. & A.	4-4-0	18x26	60	—	—
Elephant	—	Baldwin	—	16x20	54	—	—
Elephant	—	Hinkley	4-4-0	14x24	48	—	—
Neptune	112	B. & A.	0-4-0	15x18	66	—	—
Neptune	112	Hinkley	4-4-0	18x26	60	—	—
Neptune	113	B. & A.	4-4-0	18x26	60	—	—
Neptune	113	B. & A.	4-4-0	18x26	60	—	—
Yankee	—	Mill Dam Fdy	—	—	66	—	—
Yankee	—	Hinkley	4-4-0	15x18	66	—	—
Yankee	114	B. & A.	4-4-0	18x22	60	2514	950
Yankee	114	Sch. L. W.	2-8-0	20x26	48	—	—
W. Penn	—	Baldwin	—	—	66	—	—
W. Penn	—	Hinkley	4-4-0	15x18	66	—	—
W. Penn	115	B. & A.	4-4-0	16x22	66	—	—
W. Penn	255	R. I. L. W.	4-4-0	16x24	60	Was No. 210	—
W. Penn	255	B. & A. W.	4-4-0	16x24	60	—	—
W. Penn	255	Bury England	—	11x16	60	—	—
Lion	—	—	—	—	—	—	—
Brookline)	—	—	—	—	—	—	—
Brookline	116	B. & A. W.	4-4-0	18x26	60	Later No. 101	703
—	221	Sch. L. W.	4-6-0	23x34x26	66	2031	—
Hecla	117	Bos. & Wor.	—	16x20	54	—	—
Hecla	117	B. & A.	4-4-0	18x26	60	—	—
Niagara	118	Wilmarth	4-4-0	16x20	54	—	—
Niagara	118	B. & A.	0-4-0	14x24	48	—	—
Niagara	118	Sch. L. W.	0-6-0	19x29x26	48	393	107
Bee	—	Wilmarth	—	—	—	—	—
Bee	119	B. & A.	4-4-0	16x22	60	—	215
Bee	119	B. & A.	4-4-0	18x22	66	1173	—
Vesuvius	—	Bos. & Wor.	—	—	—	—	—
Vesuvius	120	R. I. L. W.	0-4-0	14x22	48	—	113
Vesuvius	20	Sch. L. W.	0-6-0	19x24	48	399	—
Vesuvius	20	Wilmarth	4-4-0	16x20	66	—	—
D. Henshaw	—	—	—	—	—	—	—

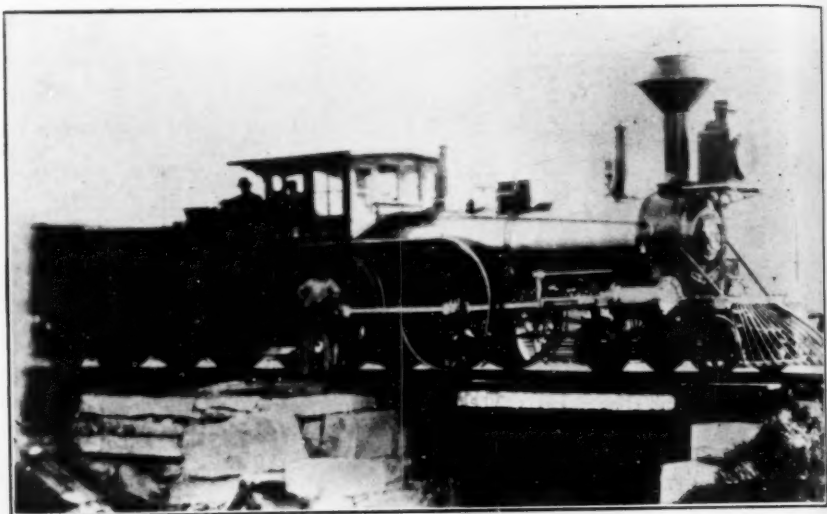


AFTERNOON TRAIN BETWEEN ALBANY AND SPRINGFIELD.

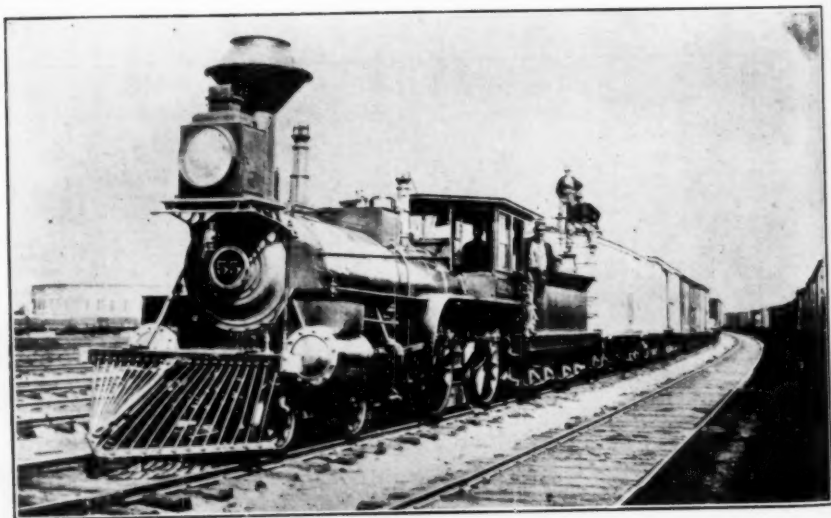
COPY OF AN OLD DAGUERRETYPE MADE IN 1842, SHOWING LOCKS & CANAL LOCOMOTIVE
ON WESTERN R. R. TRAIN



THE ENGINE HOUSE AT PITTSFIELD, MASS. WESTERN R. R. "SARANAK", MASON, 1855.



B & A #74, "SPRINGFIELD," BUILT BY W. R. R. 1865.



B & A #55, "OREGON" BUILT BY B & A R. R. 1873.

Name	Numbers Orig. New	Builder	Built	Type	Crk.	Dry-d.	N. Y. C. No. 1st. 2nd.	B. & A. 1912 No.
D. Henshaw	121 216	B. & A.	1873	4-4-0	16x22	66	1154	230
N. Hale	—	Sch. L. W.	1895	4-4-0	20x24	66	—	—
N. Hale	122 222	Wilmarth	1881	4-4-0	16x20	66	—	—
Worcester	—	B. & A. W.	1874	4-4-0	16x22	60	—	—
—	222	Sch. L. W.	1895	4-4-0	19x24	66	1157	233
—	—	Mason	1854	4-4-0	14x22	72	—	—
Worcester	123 229	Bos. & Wor.	1866	4-4-0	15x22	60	—	—
—	229	Sch. L. W.	1895	4-4-0	19x24	66	1158	234
Tiger	—	Hinkley	1842	0-4-0	13 1/2 x 20	48	—	—
Tiger	—	"	1854	4-4-0	15x24	60	—	—
Tiger	124 241	B. & A. Wor.	1876	4-4-0	17x22	60	1212	—
Express	—	B. & A.	1858	4-4-0	16x21	72	—	—
Express	125 253	Sch. L. W.	1876	4-4-0	17x22	66	—	—
—	253	Sch. L. W.	1900	4-4-0	18x24	69	1214 1135	245
Boston	—	R. Stephenson	1832	2-2-0	—	—	—	—
Boston	—	Hinkley	1855	4-4-0	15x24	60	—	—
Boston	126 261	B. & A. W.	1875	4-4-0	17x22	66	—	—
Despatch	—	Sch. L. W.	1900	4-4-0	18x24	69	1222 1138	248
Despatch	—	Bos. & Wor.	1858	4-4-0	16x21	72	—	—
Camel	127	B. & A.	1877	4-4-0	17x22	60	1177	"Prince of Wales" in 1860.
Camel	—	Hinkley	1844	4-8-0	13 1/2 x 20	36	—	—
—	128	Taunton	1860	4-4-0	15x22	60	—	—
Bison	128 213	B. & A.	1881	4-4-0	18x26	60	1217	—
Bison	—	Wilmarth	1848	4-4-0	—	—	—	—
—	129	Mason	1861	4-4-0	15x22	60	—	—
—	129	B. & A. W.	1881	4-4-0	18x22	66	—	—
—	220	Sch. L. W.	1899	4-6-0	22 & 34 x 26	66	2030	702
Meteor	—	R. Stephenson	1834	2-2-0	—	—	—	—
Meteor	—	Locks & Canals	1839	2-2-0	—	—	—	—
Meteor	—	Portland	1860	4-4-0	—	—	—	—
Meteor	130 278	B. & A.	1869	4-4-0	16x22	66	—	—
Lowell	278	"	1889	4-4-0	18x22	66	1206	Original No. 144 then 208.
Leopard	—	Locks & Canals	1836	2-2-0	—	—	—	—
Leopard	—	Hinkley	1843	2-2-2	13 1/2 x 20	48	—	—
—	131	"	1863	—	15x20	54	—	—
—	131	B. & A.	1875	0-4-0	14x24	48	—	—
—	15	Sch. L. W.	1894	0-6-0	19x24	48	398	112
Panther	—	Hinkley	1843	0-8-0	13 1/2 x 20	36	—	—
Panther	132	"	1867	4-4-0	15x24	60	—	—

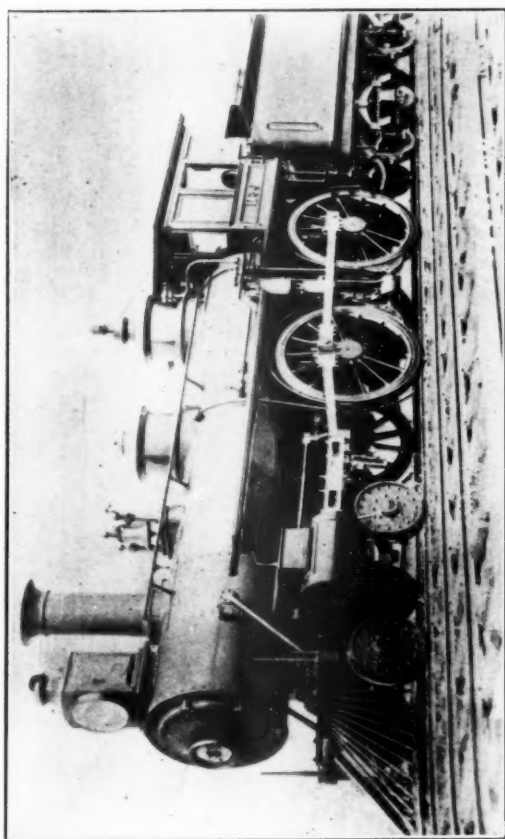
Name	Numbers Orig. New	Builder	Built	Type	Cyl.	Drvs.	N. Y. C. Nos. 1st. 2nd.	B. & A. 1912 No.
Lion	132	B. & A.	1882	0-3-0	14x24	48	—	—
Lion	133	Bury, England	1835	Renamed "Brookline" see No. 116	—	—	—	—
Lion	133	Hinkley	1863	—	15x24	60	—	—
Tartar	133	B. & A.	1879	2-6-0	17x26	54	—	—
Aetna	134	Baldwin	1839	—	—	—	—	—
Etna	134	Wilmarth	1848	—	—	—	—	—
Mars	134	Hinkley	1863	4-4-0	15x24	60	—	—
Mars	134	B. & A.	1883	4-4-0	18x22	66	1181	—
Mars	135	R. Norris	1840	—	—	—	—	—
Mercury	135	Mason	1864	4-4-0	16x22	66	—	—
Mercury	135	B. & A.	1885	4-4-0	18x22	66	—	—
Mercury	135	R. Stephenson	1835	2-2-0	—	—	1197	296
Mercury	136	Hinkley	1845	4-4-0	14x18	66	—	—
Mercury	136	Mason	1864	4-4-0	16x22	66	—	—
Buffalo	136	B. & A.	1884	4-4-0	18x22	66	1183	—
Buffalo	137	Hinkley	1865	0-4-0	13x22	48	—	—
Vulcan	137	B. & A.	1883	4-4-0	18x22	66	1200	—
Vulcan	138	R. Norris	1840	—	—	—	—	—
Vulcan	138	Wm. Mason	1865	4-4-0	16x22	66	—	—
Union	139	Sch. L. W.	1895	4-4-0	19x24	66	1161	236
Union	139	Wm. Mason	1865	4-4-0	16x22	66	—	—
Atlas	139	B. & A.	1891	4-4-0	18x22	60	1185	—
Atlas	140	Wm. Mason	1866	4-4-0	16x22	60	—	—
Victor	141	Sch. L. W.	1895	4-4-0	19x24	66	1162	237
Victor	141	Wm. Mason	1866	4-4-0	16x22	60	7 "Z. E. Coffin" in 1866.	—
Hero	141	Sch. L. W.	1895	2-8-0	20x26	48	2524	960
Hero	142	Wm. Mason	1867	4-4-0	18x22	66	—	—
Hero	142	B. & A.	1880	4-4-0	18x22	66	1186	214
Titan	143	Wm. Mason	1867	0-4-0	16x24	48	—	—
Titan	143	B. & A.	1887	0-4-0	16x24	48	86	—
Pacific	144	Wm. Mason	1867	4-4-0	16x22	60	—	—
Pacific	144	B. & A.	1889	4-4-0	18x22	66	Later No. 278	—
Falcon	145	Sch. L. W.	1896	4-4-0	19x24	66	1149	240
Falcon	145	Wilmarth	1849	4-4-0	15x18	66	—	—
Comet	145	Hinkley	1869	0-4-0	14x22	48	—	—
Comet	145	R. I. L. W.	1891	4-4-0	20x26	54	744	—
Comet	145	R. Stephenson	1835	2-2-0	—	—	—	—
Comet	146	Hinkley	1846	4-4-0	14x18	66	—	—
Comet	146	"	1869	0-4-0	14x22	48	—	—

Name	Numbers Orig. New	Builder	Built	Type	Cyl.	Drvs.	N. Y. C. Nos. 1st. 2nd.	B. & A. 1912 No.
	146	R. I. L. W.	1891	4-4-0	20x26	54	—	1612

Name	Numbers Orig. New	Breeder	Belt	Type	Cyl.	Days	N. Y. C. Nos. 1st. 2nd.	B. & A. 1912 No.
Pony	147	R. I. L. W.	1889	0-4-0	20x26	54	—	—
Barnstable	147	Hinkley	1889	2-8-0	15x22	48	—	932
Essex	148	Baldwin	1890	2-8-0	20x26	48	—	—
—	148	B. & A.	1886	4-4-0	16 3/4 x22	66	—	208
—	149	"	1889	4-4-0	16 3/4 x22	66	—	—
—	149	"	1889	4-4-0	20x26	54	—	—
G. Twitchell	150	R. I. L. W.	1885	4-4-0	20x26	54	—	—
Cochituate	151	"	1889	4-4-0	18x22	66	—	1213
—	151	"	1889	4-4-0	18x22	66	—	1224
—	152	Hinkley	1889	2-6-0	17x24	48	—	200
—	152	B. & A.	1888	4-4-0	18x22	66	—	—
Dalton	153	Hinkley	1889	2-6-0	17x24	48	—	—
—	153	B. & A.	1887	4-4-0	20x26	54	—	732
Westfield	154	"	1889	4-4-0	16x26	60	—	—
—	154	Baldwin	1890	2-8-0	20x26	48	—	933
Chester	155	B. & A.	1889	4-4-0	16x26	60	—	—
—	155	"	1886	4-4-0	20x26	54	—	760
Russel	156	"	1889	4-4-0	20x26	60	—	—
—	156	Baldwin	1891	2-8-0	20x26	48	—	2562
Jupiter	157	R. Stephenson	1836	2-2-0	11x16	60	—	934
Jupiter	157	Hinkley	1845	4-4-0	14x18	66	—	—
Jupiter	157	B. & A.	1889	4-4-0	16x22	60	—	—
—	157	"	1889	0-4-0	16x24	48	—	93
Rocket	158	R. Stephenson	1835	2-2-0	—	—	—	—
Rocket	158	Hinkley	1847	4-4-0	15x18	66	—	—
—	158	"	1870	0-4-0	14x22	48	—	—
D. W. Lincoln	159	R. I. L. W.	1891	4-4-0	20x26	54	—	—
Huntington	160	B. & A.	1870	4-4-0	17x22	66	1226	—
—	160	"	1869	4-4-0	16x26	60	—	—
Shawmut	161	R. I. L. W.	1892	4-4-0	20x26	54	—	202
—	161	B. & A.	1870	4-4-0	16 3/4 x22	66	—	—
James Parker	162	Sch. L. W.	1893	2-8-0	20x26	48	—	963
—	162	B. & A.	1870	4-4-0	16 3/4 x22	66	—	—
Fury	163	Sch. L. W.	1893	2-8-0	20x26	48	—	—
Fury	163	Wilmarth	1849	4-4-0	15x18	66	2504	940
W. Bliss	164	B. & A.	1870	4-4-0	16x22	60	—	—
—	164	R. I. L. W.	1893	4-6-0	Orig. No. 11	—	2158	700
—	164	B. & A.	1871	4-4-0	17x22	66	2032	—

Name	Numbers Orig. New	Builder	Build	Type	Orig. No. 12	Drvs.	N. Y. C. Nos. 1st. 2nd. 3rd.	B. & A. 1912 No. 701
Charlton	164	R. I. L. W.	1893	4-6-0	16x26	60	—	—
—	165	L. & A.	1870	4-4-0	20x26	48	2563	935
Adams	166	Baldwin	1890	2-8-0	16x26	60	—	—
—	166	B. & A.	1870	4-4-0	16x26	60	1198	—
Becket	167	"	1890	4-4-0	18x22	66	—	—
—	167	"	1870	4-4-0	16x26	60	1199	—
—	167	"	1887	4-4-0	18x22	66	—	—
Wilbraham	168	"	1871	4-4-0	16x26	60	—	—
—	168	Sch. L. W. Wms.	1893	4-4-0	20x26	48	2529	941
Lebanon	169	Hinkley & Wms.	1871	2-8-0	16x24	60	—	—
—	169	B. & A.	1882	4-4-0	18x22	66	1201	—
Stanwix	170	Hink. & Wms.	1871	4-4-0	16x24	60	—	—
—	170	B. & A.	1886	0-4-0	16x24	48	100	82
Delavan	171	Hink. & Wms.	1871	4-4-0	16x24	60	—	—
—	171	B. & A.	1884	4-4-0	20x26	54	725	—
Warren	172	"	1871	4-4-0	18x26	60	—	—
—	172	Sch. L. W.	1893	2-8-0	20x26	48	2526	962
Newton	173	Wm. Mason	1871	4-4-0	18x22	60	—	—
—	173	B. & A.	1890	4-4-0	18x22	66	1202	—
Natic	174	Wm. Mason	1871	4-4-0	18x22	60	—	—
—	174	Sch. L. W.	1895	2-8-0	20x26	48	2521	957
Alabama	175	B. & A.	1871	4-4-0	18x26	60	—	—
—	175	"	1887	4-4-0	20x26	54	730	—
Spencer	176	"	1871	4-4-0	18x26	60	—	—
—	176	Sch. L. W.	1893	2-8-0	20x26	48	2523	959
Brimfield	177	B. & A.	1871	4-4-0	18x26	60	—	—
—	177	"	1887	4-4-0	18x22	66	1178	210
Rochdale	178	"	1871	4-4-0	16x26	60	—	—
—	178	"	1892	4-4-0	20x26	54	746	—
Allston	179	R. I. L. W.	1871	0-4-0	14x22	48	—	—
—	179	Hink. & Wms.	1892	4-4-0	20x26	54	751	—
Brighton	180	R. I. L. W.	1871	2-6-0	17x24	60	—	—
—	180	B. & A.	1880	4-4-0	18x26	60	758	—
—	180	"	1880	4-4-0	18x24	66	—	—
Sacramento	181	"	1880	4-4-0	18x24	66	—	—
—	181	Sch. L. W.	1893	2-8-0	20x26	48	2512	948
Tatham	182	R. I. L. W.	1871	2-6-0	17x24	54	—	—
—	182	B. & A.	1891	4-4-0	18x22	60	1174	216
Tekoa	183	R. I. L. W.	1871	2-6-0	17x24	54	—	—
—	183	Baldwin	1890	2-8-0	20x26	48	2555	927
—	183	"	1890	2-8-0	20x26	48	—	—

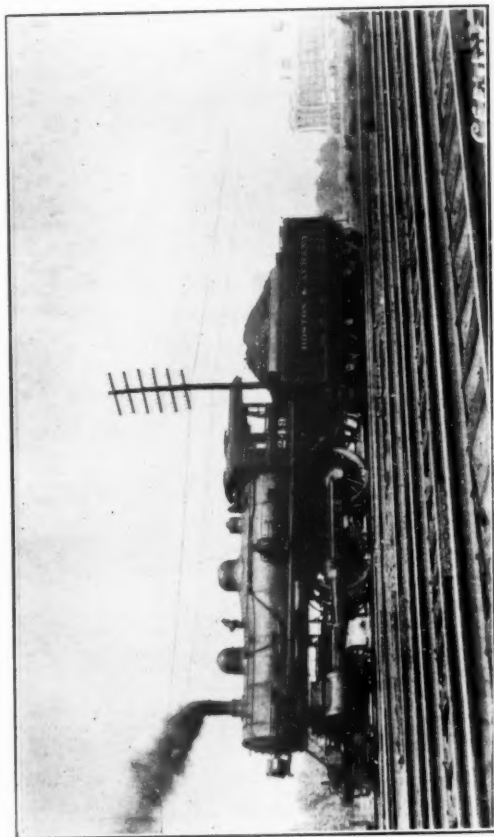
Orig. No. 116-221



B & A #136. BUILT BY B & A R. R. 1884.

Name	Numbers Owned	Builder	Ball	Type	Cyl.	Drva.	N. Y. C. New York	B. & A. 1913 No.
Onoda	184	R. I. L. W.	1871	2-6-0	17x24	54	1203	—
Globe	185	B. & A.	1890	4-4-0	18x22	66	—	—
—	186	R. I. L. W.	1871	2-6-0	17x24	54	—	211
Luna	187	B. & A.	1887	4-4-0	18x22	66	1204	—
—	188	R. I. L. W.	1871	2-6-0	17x24	54	—	910
Juno	189	Baldwin	1888	2-8-0	20x26	48	2538	—
—	190	R. I. L. W.	1872	2-6-0	17x24	54	—	923
Mariposa	191	Baldwin	1888	2-8-0	20x26	48	2551	—
Utah	192	B. & A.	1871	4-4-0	17 1/2 x22	66	—	—
—	193	B. & A.	1871	4-4-0	18x22	60	—	—
—	194	R. I. L. W.	1892	4-4-0	20x26	54	747	—
Ashtand	195	B. & A.	1872	4-4-0	18x22	60	—	—
—	196	Sch. L. W.	1872	4-4-0	18x24	69	1137	247
Cunard	197	Hink. & Wms.	1900	4-4-0	14x22	48	1221	—
—	198	B. & A.	1872	0-4-0	14x22	48	—	—
Advance	199	B. & A.	1890	0-4-0	16x24	48	90	—
—	200	B. & A.	1872	4-4-0	17x26	60	—	—
Wm. Jackson	201	R. I. L. W.	1892	4-4-0	17x26	66	749	—
—	202	B. & A.	1872	4-4-0	20x26	60	—	—
Westboro	203	R. I. L. W.	1872	4-4-0	17x26	60	—	—
Framingham	204	B. & A.	1892	4-4-0	18x22	66	736	—
DeGrand	205	B. & A.	1872	4-4-0	16x22	60	1225	—
—	206	"	1872	4-4-0	18x22	60	—	—
Onward	207	R. I. L. W.	1893	4-6-0	17x26	54	—	701
—	208	B. & A.	1872	4-4-0	Orig. No. 12	2159	2033	—
Kinderhook	209	R. I. L. W.	1892	4-4-0	18x22	54	—	—
—	210	B. & A.	1892	4-4-0	20x26	54	743	—
Schodack	211	B. & A.	1872	4-4-0	18x22	54	—	—
Grantville	212	Sch. L. W.	1895	2-8-0	20x26	48	2525	961
Wellesley	213	B. & A.	1872	4-4-0	18x22	54	—	—
—	214	"	1892	4-4-0	18x22	60	1205	—
St. Louis	215	R. I. L. W.	1872	4-4-0	17x24	60	1209	—
—	216	Sch. L. W.	1872	4-4-0	17x24	60	—	—
St. Lawrence	217	B. & A.	1900	4-4-0	18x24	69	1210	244
—	218	Sch. L. W.	1872	4-4-0	18x22	54	—	—
Stockbridge	219	B. & A.	1893	2-8-0	20x26	48	2508	944
—	220	R. I. L. W.	1892	4-4-0	18x24	54	—	—
Saxonville	221	B. & A.	1872	4-4-0	20x26	48	734	—
—	222	Sch. L. W.	1893	2-8-0	18x24	54	—	—
—	223	B. & A.	1893	2-8-0	20x26	48	2513	949
—	224	B. & A.	1872	4-4-0	16x22	60	—	—

Name	Numbers Orig. New	Builder	Build	Type	Cyl.	Drvs.	N. Y. C. Nos. 1st. 2nd.	B. & A. 1912 No.
Arctic	205	Sch. L. W.	1894	4-4-0	19x24	66	1153	228
—	206	B. & A.	1872	4-4-0	17x26	54	—	—
Anarctic	120	Sch. L. W.	1893	2-8-0	20x26	48	2516	932
—	207	B. & A.	1872	4-4-0	17x26	54	—	—
Active	136	R. I. L. W.	1892	4-4-0	20x26	54	741	201
—	208	"	1873	0-4-0	14x24	48	—	—
Alert	8	Sch. L. W.	1894	0-6-0	19x24	48	396	110
—	209	R. I. L. W.	1873	0-4-0	14x24	48	—	—
Grafton	9	Sch. L. W.	1894	0-6-0	19x24	48	397	111
—	210	R. I. L. W.	1872	4-4-0	16x24	60	Later No. 255	—
Millbury	211	Sch. L. W.	1896	4-4-0	19x24	66	1150	241
—	212	R. I. L. W.	1872	4-4-0	17x24	60	—	—
Nonantum	211	Sch. L. W.	1896	4-4-0	19x24	66	Later No. 257	242
—	212	B. & A.	1873	4-4-0	16x22	60	—	—
Oceanica	212	Sch. L. W.	1896	4-4-0	19x24	66	1152	243
—	213	B. & A.	1872	4-4-0	17x26	54	—	—
Dukes	123	R. I. L. W.	1892	4-4-0	20x26	54	739	—
—	214	B. & A.	1872	4-4-0	17x26	54	—	—
Massasoit	214	"	1872	4-4-0	17x26	54	—	—
—	215	"	1873	4-4-0	18x22	60	1172	223
Mexico	129	R. I. L. W.	1892	4-4-0	17x26	54	—	—
—	216	B. & A.	1873	4-4-0	20x26	54	740	—
Tremont	121	R. I. L. W.	1892	4-4-0	17x26	54	—	—
—	217	B. & A.	1873	4-4-0	20x26	54	737	—
Olcott	217	Sch. L. W.	1896	4-4-0	17x26	66	—	—
—	218	B. & A.	1873	4-4-0	19x24	66	1155	231
Greene	218	Sch. L. W.	1895	4-4-0	17x26	66	—	—
Penfield	219	R. I. L. W.	1873	2-6-0	17x24	54	1156	232
—	220	"	1873	2-6-0	17x24	54	1842	—
Purves	150	"	1892	4-6-0	20x26	54	—	—
—	221	"	1873	2-6-0	18x26	54	752	203
Babcock	116	Sch. L. W.	1894	2-8-0	20x26	48	2515	951
—	222	R. I. L. W.	1873	2-6-0	18x26	54	—	—
Catskill	122	Sch. L. W.	1894	2-8-0	20x26	48	2617	933
—	223	B. & A.	1873	4-4-0	18x26	54	—	—
Adirondack	157	R. I. L. W.	1892	4-4-0	20x26	54	753	—
—	224	B. & A.	1873	4-4-0	18x26	54	—	—
Malta	—	"	1873	0-4-0	14x22	48	—	—



B & A #249, BUILT BY SCHENECTADY, 1900.



B & A "TWENTIETH CENTURY LIMITED"—WEST BOUND.

Name	Numbers Orig. New	Builder	Built	Type	Cyl.	Drvs.	N. Y. C. Nos. 1st.	B. & A. No.
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Name	Numbers Orig. New	Builder	Type	Cyl.	Drva.	N. Y. C. Nos. 1st. 2nd.	R. & A. 1012 No.
Wachusett)	226	B. & A.	4-4-0	17x22	—	—	—
Modoc	227	R. I. L. W.	2-6-0	18x26	54	—	—
Mattison	127	Sch. L. W.	2-8-0	20x26	48	2620	956
Allen	228	R. I. L. W.	2-6-0	18x26	54	—	—
—	135	Sch. L. W.	2-8-0	20x26	48	2522	958
Morris	229	R. I. L. W.	2-6-0	18x26	54	—	—
—	123	Sch. L. W.	2-8-0	20x26	48	2518	954
Brown	230	R. I. L. W.	2-6-0	18x26	54	—	—
—	126	Sch. L. W.	2-8-0	20x26	48	2519	955
Caribbean	231	B. & A.	4-4-0	17x26	54	—	—
Stickney	232	"	4-4-0	18x22	66	—	—
Denny	233	"	4-4-0	18x22	66	—	—
Java	234	"	0-4-0	14x24	48	—	—
—	34	Sch. L. W.	0-6-0	19&29x26	48	394	108
Parthia	235	B. & A.	0-4-0	14x24	48	—	—
Cuba	236	"	0-4-0	14x24	48	—	—
—	36	Sch. L. W.	0-6-0	18x24	48	199	114
China	237	B. & A.	0-4-0	14x24	48	—	—
—	7	Sch. L. W.	0-6-0	18x24	48	395	109
Tuscan	238	B. & A.	4-4-0	20x26	60	—	—
—	138	R. I. L. W.	4-4-0	20x26	54	742	—
Colt	239	B. & A.	4-4-0	18x22	66	—	—
Campbell	240	"	4-4-0	18x22	66	—	—
Sargent	241	"	4-4-0	18x22	66	—	—
—	124	R. I. L. W.	4-4-0	18x22	66	—	—
Crocker	242	B. & A.	4-4-0	20x26	54	738	—
Gillett	243	"	4-4-0	18x22	66	—	—
—	243	Sch. L. W.	4-4-0	18x22	66	—	—
Kimball	244	B. & A.	4-4-0	19x24	66	1163	238
—	244	Sch. L. W.	4-4-0	18x22	66	—	—
Shaker)	245	B. & A.	4-4-0	19x24	66	1164	239
Amazon)	54	"	4-4-0	18 3/4 x 28	54	—	—
—	54	Sch. L. W.	2-8-0	20x26	48	2507	943
—	246	B. & A.	0-4-0	14x22	48	—	—
—	247	"	4-4-0	18x26	60	—	—
—	247	Sch. L. W.	4-4-0	18x24	69	1218	246
Columbia	248	B. & A.	4-4-0	18 3/4 x 28	54	—	—
—	249	B. & A.	0-4-0	14x22	48	—	—

Name	Numbers Orig. New	Builder B. & A.	Build	Type	Cyl. 18"x28	Drvs.	N. Y. C. Nos. 1st. 2nd. Orig. No. 254	B. & A. 1912 No.
—	250	Baldwin	1880	4-4-0	—	54	—	—
—	251	"	1887	2-8-0	20x26	48	2552	924
—	252	"	1887	2-8-0	20x26	48	2557	929
—	253	"	1887	2-8-0	20x26	48	2558	930
—	254	B. & A.	1880	4-4-0	18"x28	54	Renumbered 250	—
—	254	Baldwin	1887	2-8-0	20x26	48	2564	900
—	255	"	1887	2-8-0	20x26	48	2559	931
—	256	"	1887	2-8-0	20x26	48	2530	902
—	257	"	1887	2-8-0	20x26	48	2565	901
—	258	"	1887	2-8-0	20x26	48	2531	903
—	259	"	1887	2-8-0	20x26	48	2550	922
—	260	"	1887	2-8-0	20x26	48	2532	904
—	170	Sch. L. W.	1899	4-8-0	22&34x38	54	2632	800
—	171	"	1899	4-8-0	22&34x28	54	2633	801
—	172	"	1899	4-8-0	22&34x28	54	2634	802
—	173	"	1899	4-8-0	22&34x28	54	2635	803
—	174	"	1899	4-8-0	22&34x28	54	2636	804
—	175	"	1900	4-8-0	22&34x28	54	2637	805
—	176	"	1900	4-8-0	22&34x28	54	2638	806
—	177	"	1900	4-8-0	22&34x28	54	2639	807
—	178	"	1900	4-8-0	22&34x28	54	2640	808
—	179	"	1900	4-8-0	22&34x28	54	2641	809
—	180	"	1900	4-8-0	22&34x28	54	2642	810
—	287	Sch. L. W.	1900	4-4-0	20x26	75	1141	251
—	288	"	1900	4-4-0	20x26	75	1142	252
—	289	"	1900	4-4-0	20x26	75	1143	253
—	290	"	1900	4-4-0	20x26	75	1144	254

R. I. L. W. = Rhode Island L. W.
Sch. L. W. = Schenectady L. W.

Boston and Albany Locomotives.

Some of the information disclosed in making a careful study of records, now available, for the purpose of making a list of Boston and Albany locomotives from 1832 to the present time may be of interest. There appear to have been 1020 locomotives in service on the Boston and Albany, and its predecessors the Boston and Worcester Railroad and the Western Railroad which were consolidated in 1867 to form the Boston and Albany. This number includes those now in service on the Boston and Albany but does not include those used temporarily under lease or for trial.

The Boston and Worcester's first locomotive the "Boston" came from Robert Stevenson, England, in 1832. No data is at hand regarding this locomotive but the "Lion" built by Edward Bury, Liverpool, England, in 1836 was a twelve ton machine with cylinders 11x16 inches, a single pair of driving wheels sixty inches in diameter, and a pair of trailing wheels. It would now be known as type 2-2-2. The "Lion" was renamed the "Brookline" and was in service until 1865. A second "Brookline" was built by the Boston and Albany in 1880. The "Yankee" built for the Boston and Worcester in 1834 by the Mill Dam Foundry, Boston, was the first locomotive built in New England. By 1841 the Directors of the road had evidently decided that the locomotives then in use which were of the four-wheeled type were not of the proper type as it is so stated in their report of that year.

Before we leave the Boston and Worcester, we note there were four locomotives which bore the name "Meteor." The first was built by Robert Stevenson in 1834, the second by Locks and Canals, Lowell, in 1839, the third by The Portland Company, Portland, Me., in 1860, and the last one was built by the Boston and Albany in 1869. The Director's report for 1866 states that the Boston and Worcester owned 40 locomotives at the end of that year.

The Locks and Canals Company of Lowell, Mass., built twelve ten ton locomotives for the Western Railroad during the time between 1835 and 1841. These locomotives were named for the several counties of Massachusetts. The "Barnstable" appears to be the first one as it was built in 1835. Evidently these were found to be too light for the service as they were soon replaced by heavier ones built by Hinkley at Boston. The "Gilmore" built by the Western Railroad in 1851 won the honors at the speed trial of locomotives which took place near Lowell, Mass., in 1852. At the end of 1866 the Western Railroad had 103 locomotives.

When the consolidation took place in 1867 the Boston and Worcester had 38 locomotives and the Western had 109. No doubt there were some cut up and others added as the first Boston and Albany report at the end of 1867 gives the number of locomotives as 144.

For many years the "Standard" passenger locomotive on the Boston and Albany Railroad was the "American," or 4-4-0, type weighing 45 tons, cylinders 18x22 inches, driving wheels 60 and 66 inches, and 160 lbs. boiler pressure. These were replaced by heavier locomotives of the same type during the '90's. Four of the larger ones were built by the Rhode Island Locomotive Works in 1893 and thirty-one were built by

the Schenectady Locomotive Works between 1894 and 1900 inclusive. The heaviest weighing sixty-eight tons. Nearly all of the "Standard" passenger locomotives were built by the Company at its own shops.

The "Standard" freight locomotive was of the same weight, type, and boiler pressure as the passenger locomotive but with cylinders 20x26

TIME TABLE. WESTERN RAIL ROAD.

Times when Trains are to leave Stations.

Western Trains.—Dec. 4, 1843.

LEAVE.	Springfield to Greenbush.			Greenbush to Springfield.			Greenbush to St. Line to Greenbush.
	1st Pass.	2d Pass.	Freight.	1st Pass.	2d Pass.	Freight.	
Springfield,	7.00 a.m.	12.45 m.	5.30 a.m.	12.30 m.	8.30 p.m.	4.45 p.m.	
West Springfield,	7.04	12.49	5.40	12.36	8.36	4.35	
Watfield,	7.36	1.11 p.m.	6.30	12.04	8.04	3.55	
Russell,	7.40	1.34	7.00	11.41 a.m.	7.41	3.10	
Chatter Village,	8.01	1.46	7.20	11.39	7.39	3.51	
Chatter Factory,	8.29	2.14	8.00	11.09	7.09	2.14	
Middlefield,	8.44*	2.29	8.44*	10.46	6.46	1.34	
Berket,	8.54	2.39	9.11	10.36	6.36	1.10	
Washington,	9.05	2.50	9.40	10.25	6.25	12.40	
Hinsdale,	9.18	3.03	10.12†	10.12†	6.12	12.26	
Dalton,	9.30	3.15	10.37	10.00	6.00	12.00	
Pittsfield,	9.45†	3.30	11.30**	9.45†	5.45	11.30**	
Shaker Village,	9.57†	3.42	12.04	9.25	5.25	9.57†	
Richmond,	10.11	3.56	12.39	9.11	5.11	9.25	
State Line,	10.21	4.06	1.04 p.m.	9.00	5.00	9.10	6.00 p.m.
Canaan,	10.36	4.21	1.34	8.45†	4.47	8.45†	7.00
East Chatham,	10.40	4.34†	2.04	8.32	4.34†	8.15	6.47
Chatham & Corners,	11.14	4.59	2.54	8.15	4.15	7.40	6.30
Chatham Center,	11.31	5.16	3.24	7.56	3.56	7.10	6.11
Kinderhook,	11.41	5.26	3.48††	7.48	3.48††	6.55	6.03
Schenectady,	12.05	5.40	4.23	7.25	3.25	6.05	5.40
Greenbush,	12.30 m.	6.15 p.m.	5.15 p.m.	7.00 a.m.	3.00 p.m.	5.15 a.m.	5.15 a.m.

* 1st Pass. T. to Greenbush passes Ft. T. to Greenbush at Middlefield, at 8.44 a.m.

† 1st Pass. T. to do. passes 1st Pass. T. to Springfield at Pittsfield, at 9.45 a.m.

‡ 1st Pass. T. to do. passes Freight T. to do. at Shaker Village, at 9.57 a.m.

§ 2d Pass. T. to do. passes Freight T. to do. at C. Factory, at 2.14 p.m.

|| 2d Pass. T. to do. passes 2d Pass. T. to do. at E. Chatham, at 4.34 p.m.

¶ Freight T. to do. passes 1st Pass. T. to do. at Hinsdale, at 12.12 a.m.

** Freight T. to do. passes Freight T. to do. at Pittsfield, at 11.30 a.m.

†† Freight T. to do. passes 2d Pass. T. to do. at Kinderhook, at 3.48 p.m.

††† 1st Pass. T. to Springfield passes Freight T. to do. at Canaan, at 8.45 a.m.

COPY OF WESTERN R. R. TIME TABLE, 1843.

inches and 54 inch driving wheels. These were replaced by the "Consolidation," 2-8-0, type the first of which came from the Baldwin Locomotive Works in 1887. From 1887 to 1895 sixty-four of the latter type were placed in service, 36 from Baldwin, 24 from Schenectady, and 4

from Rhode Island. The Schenectadys weighed sixty-five tons. The "Standard" locomotives were built at either the Company's shops or by the Rhode Island Locomotive Works. Some of the "Standards" were built in 1891 after the first "Consolidations" had arrived.

A four-wheeled, 0-4-0, type switching locomotive weighing 32 tons was the "Standard." It had cylinders 16x24 inches, driving wheels 48 inches in diameter, and carried a boiler pressure of 130 pounds. They were also built by both the Company and the Rhode Island Locomotive Works. The first switching locomotive of the six-wheeled, or 0-6-0, type came from the Rhode Island Works in 1893.

In 1892 there were in service on the road 40 "Standard" passenger locomotives, 40 "Standard" freight locomotives, and 18 "Standard" switching locomotives. 40 "Standard" passenger locomotives were still in service in 1899 and 18 "Standard" switching locomotives, but there were only 33 of the "Standard" freights.

248 Boston and Albany locomotives were assigned New York Central numbers after the lease in 1900 although some of the numbers may not have been placed on them. They were divided as follows:

- 90 Passenger locomotives the average weight of which was 50 tons.
- 124 Freight locomotives the average weight of which was 57 tons.
- 34 Switching locomotives the average weight of which was 50 tons.

When the Motive Power was relettered and renumbered by the Boston and Albany about 1912, 150 of the locomotives taken over by the New York Central were renumbered by the Boston and Albany together with 210 additional ones placed in service on the Boston and Albany by the New York Central after the lease. The following is the 1912 list:

- 132 Passenger locomotive the average weight of which was 96 tons.
- 188 Freight locomotives the average weight of which was 89 tons.
- 40 Switching locomotives the average weight of which was 67 tons.

Of course it will never be possible to prove whether anyone ever believed it or not but there were rumors among the uninformed that immediately after the lease the New York Central took all of the good locomotives from the Boston and Albany and replaced them with worn out locomotives from their own road. This was, of course untrue, as no locomotive was taken from the Boston and Albany for use elsewhere and with a possible exception of 2 "Moguls," 3 Grand Central Switching locomotives, and 5 "Pacifies," 10 in all, all of the locomotives put in service on the Boston and Albany after the lease were new equipment, until very recently when 15 rebuilt "Pacifies" came to the Boston and Albany.

The locomotives in service on the Boston and Albany at the present time are divided as follows:

- 110 Passenger locomotives having an average weight of 122 tons.
- 135 Freight locomotives having an average weight of 150 tons.
- 74 Switching locomotives having an average weight of 93 tons.

Six of the locomotives still in service were on the Boston and Albany before the lease in 1900. One of them is the Inspection locomotive

"Berkshire." This locomotive was originally built by the Rhode Island Locomotive Works in 1869 and named the "Cochituate" number 151. It has several times been rebuilt so that none of the original machine

REGULATIONS.

1. No Train must under any circumstances leave a station before its time as specified in the TIME TABLE.

2. Passenger Trains will not wait for Freight Trains—but when a meeting of Passenger Trains is expected, neither Train will leave the Station until the other arrives, or is heard from.

3. Freight Trains will in all cases wait for Passenger Trains—and be kept entirely out of their way—never leaving a Station on the time of a Passenger Train unless in consequence of positive information received from it. They will also wait for other Freight Trains at Stations appointed for passing.

4. A Freight Train must not leave a Station immediately preceding a Station where a Passenger Train is expected to pass, unless it has its full running time as specified in the TIME TABLE.

5. A red Flag must always be exhibited upon an Engine when an Engine other than that of a regular Train is to follow it—and in case a regular Train is divided into two or more distinct Trains, Flags will be kept flying upon all the Engines of the Train except the last.

6. Lanterns must be exhibited at night at the rear of all trains and no excuse will be admitted for any neglect either in exhibiting or observing this Signal.

7. All Engines on approaching a station will sound the whistle at the posts set up as signals for that purpose—pass the switch cautiously; and in all cases stop at the Station.

8. All Engines before crossing at grade the N. & W. and the H. & B. Rail Roads, will make a full stop, and proceed only when there is seen to be no obstruction.

9. All persons whatever, employed upon the road, are required to give notice of any obstruction to the passage of the trains by exhibiting a red flag conspicuously and at a sufficient distance from the obstruction, in both directions of the road—and all Conductors, Enginemen, &c., connected with the train, are required to regard such a signal, and to proceed with extreme caution until the cause of the obstruction is ascertained.

10. The clock at the upper depot in Worcester shall be taken to be the standard time, and all conductors before leaving Worcester are required to compare and regulate their time by that clock, and to see that the clocks at all other stations which they pass conform to the standard time. The Trains west of Springfield will in like manner be governed by the time at the Springfield depot.

REVERSE SIDE OF W. R. R. TIME TABLE, 1843.

may now exist in the present "Berkshire." It was converted into an inspection locomotive in 1903.

In addition to the "Berkshire" the remaining six include five "American" type passenger locomotives built by Schenectady in 1896 and 1900. Their original Boston and Albany numbers were 211, 212, 286, 288 and 290. All of these six remaining Boston and Albany "Old Timers" will no doubt be cut up during the year 1930 and thus remove the last connection between the old Boston and Albany and the Boston and Albany as we know it today.

Since its lease to the New York Central R. R. in 1900, the Boston & Albany R. R. has received, save in a few instances, the following new locomotives. For brevity the engines that appear are the present series of numbers inaugurated in 1912. The engines were received as follows:

1901

964- 972	Schenectady	2-8-0	22&34x32"	57"	187000
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1902

400- 405	Schenectady	4-4-2	20 1/2 x26"	79"	188500
973- 975	"	2-8-0	22&34x32"	57"	187000

1903

500- 509	Schenectady	4-6-2	21x28"	75"	221200
976- 989	"	2-8-0	21x30"	63"	205300

1904

515- 520	Schenectady	4-6-2	22x26"	75"	230000
990- 999	"	2-8-0	23x32"	63"	220200

1906

300- 309	Schenectady	2-6-6	20x24"	63"	159000
					Suburban Service.

1907

115- 128	Rhode Island	0-6-0	21x28"	57"	162000
310- 317	Schenectady	2-6-6	20x24"	63"	162000
					Suburban Service.
521- 532	"	4-6-2	22x26"	75"	235000
704- 728	"	4-6-0	22x26"	69"	211000
1000-1029	"	2-8-0	23x32"	63"	237000

1908

124- 135	Schenectady	0-6-0	21x28"	57"	166000
533- 544	"	4-6-2	22x26"	75"	238000
1030-1049	"	2-8-0	23x32"	63"	239000

1910

510- 514	Schenectady	4-6-2	22x26"	75"	226500
	Engines built in 1903 and transferred from N Y C R R				

1911

545- 554	Schenectady	4-6-2	22x26"	75"	238000
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1912

136- 140	Manchester	0-6-0	21x28"	57"	170000
555- 559	Schenectady	4-6-2	22x26"	75"	241000
1050-1058	"	2-8-0	23x32"	63"	242000
1300-1303	"	2-6-6-2	21 1/2 & 34x32"	57"	354000

1913

141- 148	Manchester	0-6-0	21x28"	57"	170000
560- 565	Schenectady	4-6-2	22x26"	75"	241000
1200-1205	"	2-8-2	25x32"	63"	283500

1914

144- 147	Schenectady	0-6-0	21x28"	57"	172000
1206-1213	"	2-8-2	25x32"	63"	283500

1915

1214-1223	Brooks	2-8-2	25x32"	63"	275500
Rebuilt from 2-8-0 type and transferred from N Y C					

1916

148- 152	Schenectady	0-6-0	21x28"	57"	173000
1304-1307	"	2-6-6-2	21 1/2 & 34x32"	57"	354000

1917

34- 40	Schenectady	0-8-0	23x32"	57"	194500
1308-1312	"	2-6-6-2	21 1/2 & 34x32"	57"	357000

1918

30- 33	Schenectady	0-8-0	23x32"	57"	194500
42- 47	Lima	0-8-0	23 1/2 x30"	57"	216500
Rebuilt from 2-8-0 type					

1919

1100-1109	Brooks	2-10-2	27x32"	57"	352000
Transferred to C C C & St L in 1926					

1920

48- 49	Lima	0-8-0	25x28"	51"	219000
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1921

50- 53	Lima	0-8-0	25x28"	51"	219000
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1922

183	Schenectady	2-8-2	28x30"	63"	335000
Transferred to N Y C in 1926					

1923

54- 61	Lima	0-8-0	23 1/2 x30"	57"	215000
184- 190	Schenectady	2-8-2	28x30"	63"	335000
Transferred to N Y C in 1926					
575- 588	Schenectady	4-6-2	26x26"	72"	272000
Engines built in 1913 and received from N Y C					

1924

62- 65	Schenectady	0-8-0	23 1/2 x30"	57"	218000
589	Baldwin	4-6-2	25x26"	72"	272000
Engine built in 1911 and received from N Y C					

1925

590- 594	Brooks	4-6-2	26x28"	75"	298000
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1926

596- 599 Schenectady	4-6-2	26x28"	75"	298000
1400-1424 Lima	2-8-4	28x30"	63"	385000

1927

1425-1444 Lima	2-8-4	28x30"	63"	385000
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1928

400- 404 Schenectady	4-6-6	23 1/2 x26"	63"	352000
600- 604 "	4-6-4	25x28"	75"	353000

1930

Ten engines of the 2-8-4 type have been ordered from Lima.

Five engines of the 4-6-4 type have been ordered from Schenectady.

The reader will note that scarcely a year has passed but that this road has received new power.

Before closing this interesting list of locomotives two interesting items have come to the attention of the author, the first relating to the employment of men on the Western R. R. taken from the minutes of the meeting of March 11, 1836 and in passing it should be stated that Major Whistler, the Engineer of the road and who successfully completed it, was a West Point graduate. The other item relative to the Winan's engines is of interest as it relates to the trouble given by these engines.

BOSTON & ALBANY RAILROAD

N. Y. C. R. R. CO., LESSEE

Valuation Department

"FROM CORPORATION RECORDS OF WESTERN RAILROAD"

MEETING OF MARCH 11, 1836.

Read and laid on the table.

Mr. Jackson, a minority of the Committee appointed to consider and report on the System for building the road and the Officers to be employed thereon made the following report.

Western Railroad Corporation

The undersigned, one of the Committee directed to consider and report on the System for building the road and the officers to be employed thereon asks leave to submit the following Report.

That in his opinion it will be for the interest of this Corporation and the public to employ a practical man, as superintendent to take charge of constructing the road, under the direction of this Board in preference to a professed Engineer. Because under such direction it is believed the Road will be constructed, at much less cost, and with greater despatch, with better judgment and much less perplexity to this Board.

If it should be objected that this arrangement would be a departure from the mode usually adopted heretofore, it may be replied that it is quite time the former course should be abandoned, considering the great and increasing dissatisfaction which has resulted from it.

The change recommended is not without precedent and will it is confidently believed meet with the approbation of the most discerning, if not the largest portion of the stockholders of the Community.

The undersigned would therefore recommend a course which would lead to free competition among our practical and intelligent working men in preference to confining the choice to the graduates of West Point, who, however skilful they may be in their own department of Engineering are notoriously unfit for the practical purposes of the general direction and superintendence of such a work. It cannot be expected that any institution can take boys from the lap of wealth, luxury and idleness and fit them for all the duties of such an enterprize.

Scientific men, from their manner of life, Education and pursuits rarely possess those habits of economy, industry, foresight and judgment which are indispensable to great practical operations, and which are more generally found among those whose experience and business knowledge are the result of a life of active industry and the basis of a sound judgment.

The habits, feelings and address of professed engineers are essentially military, uncongenial to the purposes of business transactions and repulsive to those of the mass of the people, with whom they come in contact in this work.

The beauty of a bridge, the imposing appearance of a viaduct has more charm for them, than the plain and homely attributes of utility and economy.

To obtain a scientific reputation, to excite the admiration of those whose tastes delight in elegance and grandeur without regard to cost, is their chief ambition; and these views are fully confirmed by a recent report of the Committee of ways and means in Congress.

That a combination exists among them, express or tacit, to engross the management of public works, and to enforce their own peculiar views and interests, to the exclusion of practical men, I have no doubt. However well qualified any one may be who has not received a scientific education at the Schools, their influence would be exerted to his disparagement and exclusion in the direction of this business.

If an Engineer is sufficiently familiar with instruments and mathematics to take levels and calculate embankments and cuttings, he has science sufficient for railroad purposes under the direction of a superintendent of sound judgment who will be more likely to regard with singleness of purpose the means to accomplish the work and the great end to be obtained in its structure. This end being no other than to build a road for utility alone, and in the cheapest and most advantageous manner.

If therefore we can find a man to superintend the construction of the Road, of persevering habits of industry, of sound judgment, and some experience in public works; one who is generally known and influential in the community, and one who would be willing to exert his influence and devote his whole time to the work, it will be decidedly for the interest of this enterprise to appoint him the chief Agent, having, under the Director the responsibility of managing the work; and this appointment should be for one year only, so that in case of dissatisfaction the connection may easily be dissolved.

It is believed that a Superintendent can obtain as capable and faithful Engineers as any other person, and that he should have the right to nominate to the Board, the Engineers and sub-agents to be employed under him.

The undersigned would therefore respectfully but solemnly protest against committing the direction and superintendence of the Western Railroad to that class of Engineers to whom this Report has reference, believing that such a course of management would result in extravagant expenditure and delay, and thus destroy the just expectation the community entertain of cheap travel and transportation.

In conformity with these views a resolution has been appended to this report, the adoption of which is recommended to the Board.

All which is respectfully submitted by

(Sgd.) FRANCIS JACKSON.

Original in Treasurer's Office B. & A. R. R.

Mr. George W. Bliss, of Springfield, Massachusetts, organizer and first General Agent of the Western Railroad from March 16, 1836 to

February, 1844, and President of the road from thereafter until January 3, 1846, the latter office he resigned because of ill health, gives in his "Historical Memoir of the Western Railroad," published in 1863, an interesting account of the Winans engines on that road.

"In providing motive power, it had always been conceded, that the transportation of freight over the heavy grades of the Road west of the river, would require powerful engines. The Legislative Committee reports that Messrs. Howard, Jackson, Lincoln, Bliss and Whistler were appointed in July, 1841, a Committee on moving power, 'with power to authorize the purchase of such engines as they thought proper.' That they issued circulars and received replies. Major Whistler, the engineer of the Road, went to Baltimore and examined 'The Maryland,' an engine by Ross Winans, of twenty tons, eight wheels, all connected, making the whole weight effective for adhesion. He reported favorably, and Messrs. Jackson and Lincoln were appointed a sub-committee to make a further examination and enquiries, with power to purchase. In company with the chief machinist of the Lowell Locks & Canal Company, manufacturers of locomotives, they went to Baltimore, and after satisfactory experiments and inquiries, they confirmed the opinion of Major Whistler, and the Committee on moving power, on August 26, 1841, closed a contract with Winans for seven engines, to be delivered by December 16, 1841, at \$11,000 each.

"The Company had previously had engines of the Lowell Locks & Canal Company at about the same price. A minority of the Directors were strongly in favor of engines by Norris of Philadelphia, who proposed to make equally good ones at less prices.

"Major Whistler, a life-long engineer, and at one time in superintendence of the Lowell Machine Shops, had known the character and capacity of the Norris engines, as they were running on the Worcester, Norwich and Hudson & Berkshire Roads, and preferred the Winans machines for heavy freight trains, for which service they were designed. The other members of the Committee on moving power, except perhaps Mr. William Jackson, had had no experience and no practical knowledge upon the subject. They had confidence in the opinion and skill of Major Whistler, under whose supervision the engines were to be used. Mr. Jackson, as a director and agent of the Worcester Road, was familiar with the Norris engines, which daily passed his door.

"During the hearings before the Legislative Committee, the President informed them, that the stockholders' Committee had appointed a sub-committee to witness trials of the Winans with other engines, with authority to invite others to witness them; that the principal Railroad Superintendents and engine builders in this vicinity were requested to attend. Several of the legislative Committee expressed reluctance to proceeding further on the subject of engines, relying upon a full examination by the Committee of stockholders; to which the President replied, that, if the Committee went into the subject sufficiently to express an opinion, he wished to produce witnesses from the road, who had run the Winans engines; and to exhibit evidences of trials. Upon which the Committee had a consultation, and the President understood the chair-

man to say, that the Committee did not wish to proceed farther ON THIS SUBJECT, unless the Directors desired to go on. The President in a subsequent letter to a majority of the Committee, stated that he did not suppose they would express any opinion upon this subject, and he forebore to bring in witnesses from the road.

"In the meantime the sub-committee of stockholders having procured the attendance of Messrs. Parker and Woodworth of the Worcester road, Storrow of the Lowell, Lee of the Providence, Pratt of the Norwich, Whitwell of the Lowell and Nashua, Hill of the Eastern, Waterman of the Hudson and Berkshire, Messrs. Hinkley of Boston and Brownell of Lowell, engine builders, proceeded with the proposed experiments and trials, on the twenty-first and twenty-second of February, 1843. At the close, the sub-committees submit the certificates of the EXPERTS, and say, 'that upon one point, as regards these engines, there will be no dissenting voice, viz: that the main feature in which they differ from all others, in use on the road, is, their having eight wheels, all of which are drivers; thus making the whole weight of the machine effective, while it is so distributed as to produce the least possible injury to the road. Seven of the gentlemen invited, reported that from the trials had, as to the power of the Winans engines to draw over the eighty-three feet grade, loads of eighty tons of merchandise and sixty tons of cars, in all one hundred and forty tons behind the tender, which they were told was the performance expected of them, and for which they were constructed, they had no doubt they were equal to it, because they had seen them do more.' That they saw no defect in principal, and did not believe any such existed, that the principal fault was a frequent deficiency in steam, not from want of fire service, or of furnace, but that it probably arose from the short chimney rendered necessary, by the upright position of the boiler, and that this want of draught can probably be obviated at a comparatively small expense. That as to the consumption of fuel, and as to repairs, it requires a larger experience to judge; that as to the peculiar principle of these engines, abundant adhesion, and weight on wheels, below what is usual in other engines, 'we regard it as of very great value, and one of which should not on any account be relinquished. It is peculiarly important, on the Western Road, because of the steep grades, requiring great adhesion to surmount them.' (The chimney of the first of these engines brought upon the road proved too high for some of the bridges, and the chimneys of all were shortened, thus affecting the draught. Subsequently all the low bridges on the road were raised. Some parts of the engines proved too weak, and Mr. Winans came upon the road and made the necessary changes at his own expense).

"Contrary to the understanding of the President of the Road, the Legislative Committee did report on the subject of the Winans engines, giving their 'opinion that the directors assumed too great a responsibility in the purchase of so large a number of engines, as they had not at that time been sufficiently tested with the use of wood, to justify an outlay of nearly \$80,000.' The majority of the committee also express the 'opinion that on the first of February, 1842, when the third engine

was delivered, they had been sufficiently tried to justify a well-founded apprehension, that they would prove incompetent, without material alterations, to perform the duty expected of them.

"The Committee also stated their conviction, that the Winans engines consumed more fuel, and were more expensive for repairs than the others. Upon neither point, had there, at the date of the report, been sufficient experience to judge correctly. As to the repairs, they were principally made by Winans in 1842. The Committee estimate the cost of fuel, oil and repairs, PER MILE RUN, in comparison with other machines. The President contended that the true measure was THE DUTY PERFORMED, and this more especially as applied to the consumption of fuel. Mr. Barnes, the engineer, said, 'The comparative expense will depend upon the DUTY PERFORMED.' THE COST PER TON PER MILE, OR PER PASSENGER PER MILE RUN, is universally held as the only true criterion. In 1841, the cost of fuel per ton per mile, was 189/1000 of a cent. In 1842, with the Winans engines, it was 183/1000 cents.

"It is proper to note, that in June, 1842, Major Whistler was called into service of the Russian Government, to construct the St. Petersburg and Moscow Railroad, and the company were not only deprived of his services, and supervision, when the Winans engines were getting into full operation, in 1842, but also of his advice and assistance during these protracted trials and investigations. His duties were, by vote of the Board, devolved upon the President, who had no professional experience on the principal subject before the committees.

"Nine of the Committee spent two days at Springfield, in sundry examinations, and read the voluminous reports of this and prior years, on the subject of engines, and in their report they gave a history of the proceedings of the directors on the subject of motive power. They say that at the request of Norris, a committee made a trial of one of his engines, with the Lowell engine Suffolk, and reported, 'that no part of the performance of the Norris engine, either on the Worcester or Western Road, indicates that its power was at all superior to that of the Lowell engines;' 'that at the trial at Springfield, the Suffolk gave decided and unequivocal evidence of superiority.'

"A majority of the stockholder's Committee reported, 'that reasonable care was taken in examining the pattern engine, America, (the Winans machine, at Baltimore,) and that the purchase of the engines was judicious' and 'that they were satisfied with the honorable fulfillment of their contract by the contractors'—that 'the Winans machine failed in many parts, which were too small; but that Winans made changes and repairs at his own expense, during the ninety days allowed for their trial.'

"On the contrary, a minority of the Committee, Messrs. Pickering, Homer and Thomas, in their report, condemn the engines in every respect, their construction, their power, the expensiveness of operating them, uncertainty of keeping time, the want of capacity of the tenders, being on four wheels, and they add, that the first engine delivered should have been tried on the Western Road, before ordering or accepting others.

"The only matter which fell under the animadversions of either Committee, was the purchase of the Winans' engines, which it was conceded had not been sufficiently tested, to judge their economical efficiency. The contract for freight engines had been too long postponed, as the road was to be opened through in December, 1841, giving only a few months for construction of the engines. This was the reason assigned by the Engineer and Superintendent for engaging so many at once. All were anxious to get powerful machines, with the least weight on each wheel. Probably no man in the country was more competent to judge the character of the different kinds of engines for specified work than Major Whistler. He, and the Directors, and Agent, acted in good faith in the matter; and, from the evidence they had then, and examinations made in 1843, and the trials and experiments made by the experts, the purchase was fully justified.

"But it is proper, in this connection, to say, that, upon a trial of several years, either on account of the prejudices against them among the operatives, or some of the officers, and consequent want of care, or the practical defects of their construction, and operation, or both, the Winans engines, did not on this Road, meet the expectations of their early friends; and that, after eight years from the time of their introduction on the Road, they were gradually laid aside, and the annual report of the Directors, of January, 1850, does not include one of them in the schedule of engines on hand.

"The writer is, however, favored with a letter of late date, from one of the EXPERTS on the trial of engines by the last Committee, and who subsequently had a large experience as Superintendent of the Baltimore & Ohio Road, where Winans' engines of somewhat similar, though modified construction, were extensively used. The writer says, 'he found a dozen engines similar to the 'Crabs' in all respects, excepting that they had horizontal boilers; that they were of the heaviest class at that time in use, and did good service;' that Winans 'deserves the credit of having been the maker of successful engines, having all their weight applicable to draft, on eight wheels, and more simple in the PLAN than any machines I have ever seen built or pictured;' that 'engines now (in 1862) in use on the greatest Railroad in our country, attest the soundness of the main distinctive principle of the 'Crabs', viz., the adhesion of all the wheels in connection, whereby a machine of given weight, propels a larger load than under the more popular plan.'

In the report of the Engineer of the Road for 1843, he mentions the Winans engines and gives the dates of their first trip. They are as follows:

"Maryland" first trip Jan. 1, 1842.

"Michigan" first trip Jan. 26, 1842.

"Ohio" first trip Feb. 15, 1842.

"Illinois" first trip Apr. 1, 1842.

"Arkansas" first trip Aug. 1, 1842, rec'd direct from Philadelphia.

"Indiana" first trip Aug. 29, 1842, rec'd direct from Philadelphia.

"Missouri" first trip Sep. 1, 1842, rec'd direct from Philadelphia.

In his report he mentions the "Albany" just having been received (1843) from Winans and states that it was the "Illinois" that was under competitive test with the Locks & Canal engine "Rhode Island."

Kinmond Brothers' Locomotive Works, Montreal

By ROBERT R. BROWN.

IN 1853, when the Grand Trunk and many other Canadian railways were projected, Kinmonds of Dundee, Scotland, assuming that Canada would be a profitable field for them opened a branch factory in Montreal for the manufacture of locomotives and other kinds of machinery. This was the first locomotive works in Montreal and their first engine, Grand Trunk No. 17, was the second locomotive built in Canada. Altogether they built eleven locomotives for the Grand Trunk Railway and one for the Montreal and Bytown Railway. They resembled the Portlands, then the favorites in Canada, except that English type plate frames were used. Kinmonds turned out work of the very best quality and their prospects of success were excellent but, in common with many other railway ventures, they went under in the great commercial depression of 1857.

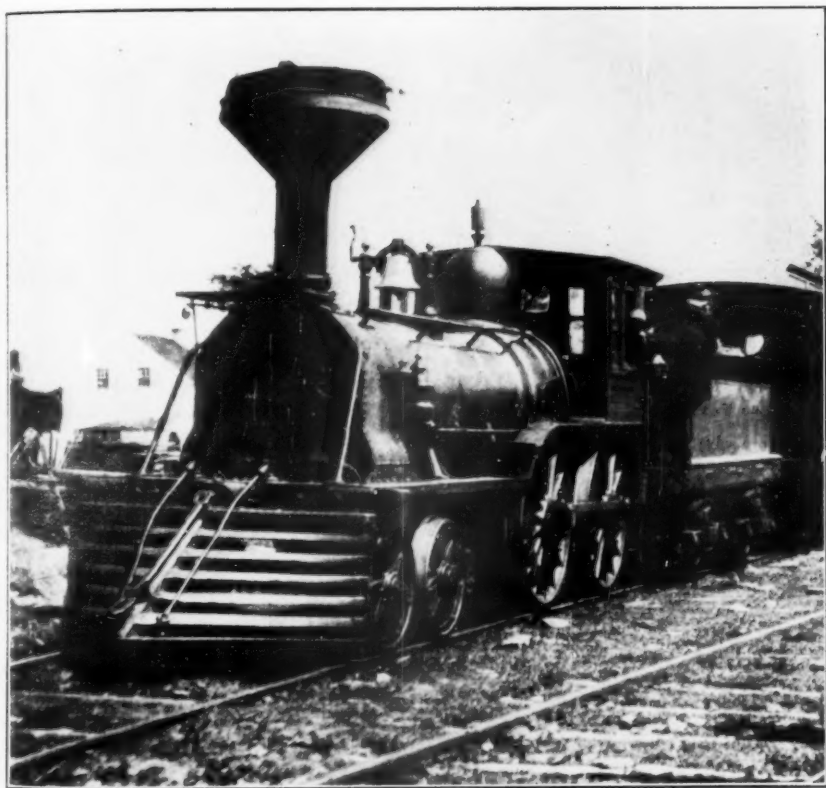
The "Carillon," built for the Montreal and Bytown Railway, ran for 56 years on the Carillon and Grenville Railway and finally was scrapped in the spring of 1914; it probably holds the Canadian record for long service. The completion of the "Carillon" is mentioned in the *Montreal Gazette* of September 2nd, 1854:

Kinmonds' Locomotive Factory.

There is now completed and standing outside on the rails near the factory, close by the Lachine Railroad Station, a superb locomotive engine and tender intended to be sent up immediately to Carillon to run between that place and Grenville over that section of the Montreal and Bytown Railroad. This is the ninth engine made by Messrs. Kinmond during the last twelve months, besides other descriptions of engines and other work; the other eight having been purchased by the Grand Trunk. The present one is a beautiful specimen of that wonderful iron horse and is well worthy of the notice and admiration of the public. This factory employs 170 or 180 persons—is the only locomotive factory in Lower Canada (now the province of Quebec) and well deserves public encouragement.

The following is a list of the locomotives built by Kinmonds in their Montreal factory:

Sept. 1853	Grand Trunk	# 17	Pass.	16x24	4-4-0	66"	26	tons
Nov. 1853	" "	20	Frt.	15x24	4-4-0	60"	26	"
Feb. 1854	" "	31	Frt.	16x24	4-4-0	60"	26	"
June 1854	" "	29	Frt.	16x24	4-4-0	60"	26	"
June 1854	" "	30	Pass.	16x24	4-4-0	66"	26	"
July 1854	" "	10	Frt.	14x21	4-4-0	60"	22	"
Aug. 1854	" "	25	Pass.	15x21	4-4-0	66"	28	"
?	" "	?						
Sept. 1854	M. & B. R. R.	2	Frt.	14x21	4-4-0	60"	22	"
May 1856	Grand Trunk	71	Pass.	15x21	4-4-0	66"	28	"
Oct. 1856	" "	86	Pass.	15x21	4-4-0	66"	28	"
Nov. 1856	" "	87	Pass.	15x21	4-4-0	66"	28	"



"CARILLON"

Built 1854 for the Montreal and Bytown Railway by Kinmond Brothers, Montreal.

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The article in the *Montreal Gazette* distinctly stated that eight locomotives were built for the Grand Trunk during 1853 and 1854 but the list in the Grand Trunk Annual Report of 1859 shows only seven received from Kinmonds during that period so we can only conclude that one was wrecked or otherwise disposed of some time between 1854 and 1859.

No locomotives were built in 1855 and in an effort to get business an advertisement appeared in the *Gazette* of June 2nd, 1855:

Locomotive Engine Works

Montreal

The Subscribers, in addition to the manufacture of Locomotive Engines are prepared to Furnish

STEAM ENGINES, BOILERS, Etc.,

of the most efficient and approved character for

SAW AND GRIST MILLS

as well as every description of Millwright Work.

Kinmond Brothers,
Engineers.

Bibliography.

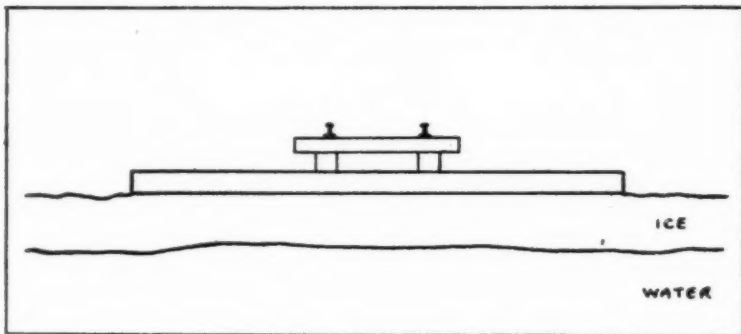
Montreal Gazette.

Grand Trunk Railway, Annual Report, 1859.

The Montreal Ice Railway 1880-1881

By ROBERT R. BROWN.

ONE of the most curious and interesting railway ventures in Canada was the famous railway built across the ice of the St. Lawrence River, between Montreal and Longueuil, during the winters of 1880 and 1881. Previous to the construction of the Canadian Pacific Railway bridge at Lachine, near Montreal, in 1887, the only railway bridge across the St. Lawrence was the Victoria, owned by the Grand Trunk Railway and that Company was not very friendly to rival lines and practically refused to allow them the use of the bridge. During the seventies, two railways of considerable size were built; the South Eastern Railway, on the South side of the St. Lawrence, extending from Longueuil, opposite Montreal, to Newport, Vermont, and with branches to Sorel, St. Guillaume and Frelighsburch; while on the North shore of the St. Lawrence, the Quebec, Montreal, Ottawa and Occidental Railway had lines extending from Montreal to Quebec and to

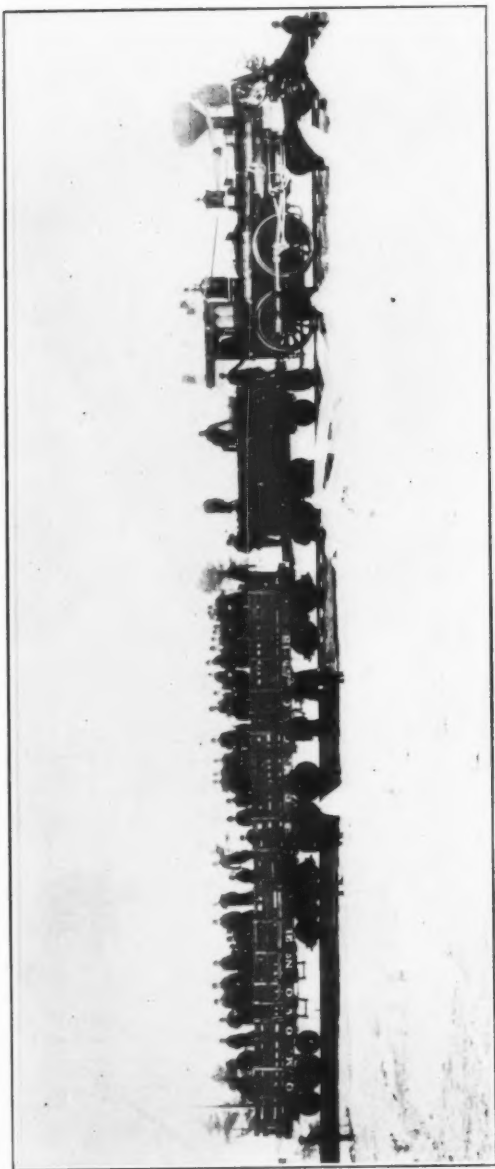


MONTREAL ICE RAILWAY 1880-1881. DETAILS OF TRACK STRUCTURE.

Copied from the original Engineer's Plans published in *L'Opinion Publique* on February 19th, 1880.
Robert R. Brown.

Ottawa. In January 1880, Mr. L. A. Senecal, who controlled the South Eastern, was appointed General Superintendent of the Quebec, Montreal, Ottawa and Occidental, which had just been built by the Provincial Government. These two railways had not been very successful but it was hoped that by exchanging traffic and working together it would be to their mutual advantage. The Q. M. O. & O. needed an outlet to the United States and the South Eastern was the only one not under the control or influence of the Grand Trunk.

For financial reasons, a bridge across the river was out of the question, so the directors of the two railways decided to try a scheme that had been proposed several times in the past, but which no one had had



INAUGURATION OF THE ICE RAILWAY BETWEEN MONTREAL AND LONGUEUIL, JANUARY 31s, 1860.

Photo by Notman.

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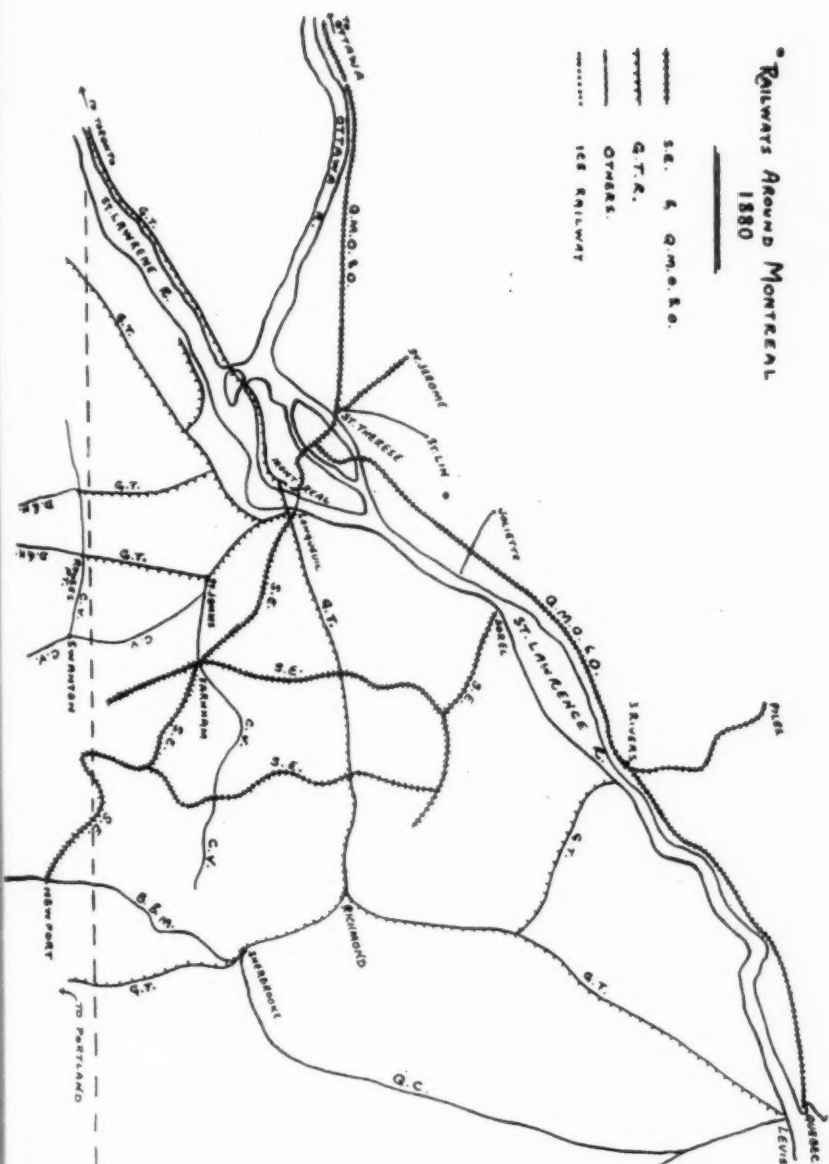
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Railways Around Montreal 1880

----- S.E. & Q.M.O. & C.
 - - - - - G.T. & C.
 - - - - - OTHERS.
 - - - - - I.C.R. RAILWAY



the courage to try. A subsidiary company, La Compagnie de Traverse de Chemin de Fer d'Hochelaga a Longueuil, was formed to build a connecting line across the ice in winter and to operate a car ferry in the summer. There were many doubts and some ridicule, and the papers of the day were filled with letters, pro and con, from such well-known people as Constant Reader, Subscriber, Pro Bono Publico, and others.

Small holes were bored in the ice to gauge the thickness and it was found that the ice varied from two to four feet in thickness, and was quite solid enough to support the weight of a light train. Early in January work was started, grading and leveling the snow and ice, from the South Eastern terminus at Longueuil across to the Q. M. O. & O. tracks, near the Hochelaga station in the city of Montreal, a distance of 3000 yards. To distribute the weight over a large area of ice, cross timbers, 12"x12", varying in length from 12 to 24 feet, were laid on the ice, and then timbers of similar dimensions were laid longitudinally on top of them and spiked down. Then on top of the longitudinal timbers, ordinary ties were laid and spiked and light iron rails completed the structure. The line was completed on January 29th, 1880 and loaded cars were hauled, by horses, across to Montreal.

The official inauguration took place two days later, on Saturday, January 31st, when a train, consisting of a small locomotive, the "W. H. Pangman," and two flat cars, fitted with seats and railings, set out with a load of Government, Civic and Railway officials and guests, while other, less venturesome, guests crossed the river in sleighs. The train was gaily decorated with flags and evergreens and a large stuffed beaver was mounted on the pilot of the engine. The locomotive weighed about 25 tons, the two flat cars about 8 tons each and the 250 passengers probably brought the total weight of the train up to about 60 tons. There was great excitement as the train started out over the ice, especially as the weight of the train caused the water to bubble up through the cracks and holes in the ice, and the spectators on shore fully expected to see the passengers get a cold and sudden bath. However, the train continued on its way, at about ten miles per hour, and finally, after having stopped for a few minutes at the middle of the river while photographs were taken, arrived at the South Eastern station, at Longueuil, where refreshments were served by the proprietor of the nearby Richelieu Hotel. Toasts and speeches followed but despite the gratifying results of the experiment there were still many who had misgivings.

The line was used about two months, though horses replaced the locomotives after the middle of March and by the end of that month the ice began to be insecure, so the track was taken up. By April 17th the river was clear of ice and the new car ferry, the South Eastern, started running. Traffic had been handled, without much difficulty, practically the whole winter, so the following winter the track was laid on the ice again but, after a few days, the men in charge became over-confident and took 17 loaded cars over to Longueuil in one train, thus weakening the ice. Returning to Montreal, the locomotive, the "St. Pie," had just left the south shore when there was a loud crack, the men were seen jumping from the train and the locomotive and two cars gradually dis-

appeared from view, sinking to the bottom of the river, where they remained until the following summer. The numerous critics were jubilant and the enterprise had to be abandoned.

It is related how after the accident someone asked, "Eh bien, M. Senecal, quand partira-t-il votre train?" (Well, Mr. Senecal, when is your train going to leave?), to which he replied, "Attendez un peu, la locomotive s'est arretee ici pour prendre de l'eau." (Wait a bit, the locomotive has just stopped here to take water). The ice railway was never again attempted and during that and succeeding winters, passengers and freight were taken across the river in sleighs, until a few years later both the South Eastern and the Quebec, Montreal, Ottawa and Occidental were acquired by the Canadian Pacific Railway, and then were connected by the new St. Lawrence Bridge at Lachine, a few miles above Montreal.

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The Liverpool & Manchester Railway

A Centenary of World-Wide Interest.

By D. S. BARRIE.

FIVE years ago, in 1925, there was celebrated with fitting ceremonial in the North East of England the hundredth anniversary of the opening of the Stockton & Darlington Railway, the first public railroad proper in the world, and two years later (1927) saw the centenary of the Baltimore & Ohio Railroad of America.

This year, 1930, takes the centenary period of these early railways a step further with the 100th anniversary of the Liverpool & Manchester Railway of England, which was formally opened for traffic on September 15th, 1830. This year, too, witnesses the centenary of the first public railway in the South of England, the Canterbury & Whitstable, a line only six miles long whose only claim to recognition by the railway historian is the peculiar insistence of its promoters upon the inclusion in the system of a tunnel, which was regarded as a desirable novelty, although both useless and expensive!

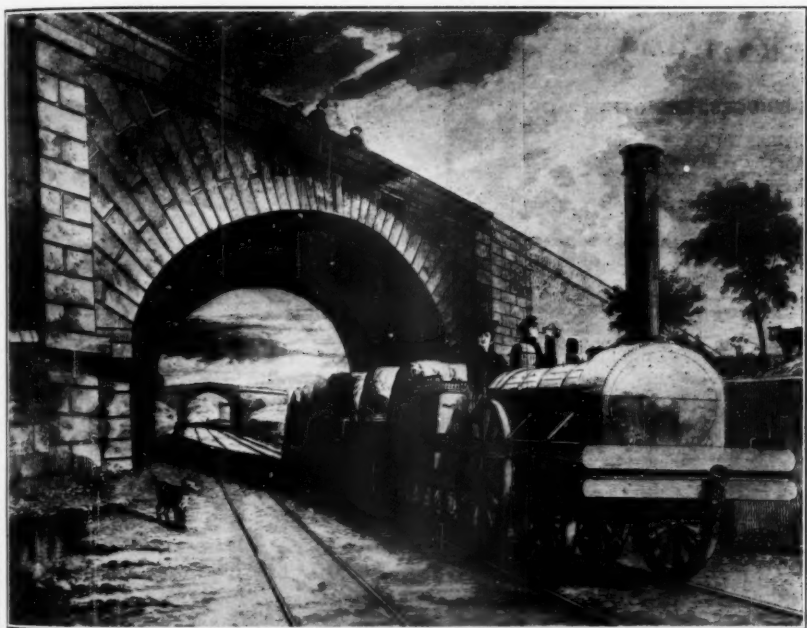
The centenary of the Liverpool & Manchester line, however, is an event of first-class importance in the history not only of railways but of transport generally, for the opening of this system definitely established what its predecessors had failed satisfactorily to prove—that railways were the great transport medium of the future.

The Liverpool & Manchester line is noteworthy, too, because it was the first section to be publicly opened of what is now the biggest railway in Britain, if not in Europe—the London, Midland and Scottish, which now penetrates 32 of the 40 counties of England, owns nearly 7,000 route miles of track, and employs a staff of over a quarter of a million workers.

At the time of the birth of the Liverpool & Manchester Railway, there were probably about 50 miles of railroad in use in Great Britain, but the great majority of these roads were tramways pure and simple, worked either by gravity or horses, and used only for the conveyance of minerals. And it must be remembered that the Stockton & Darlington, which was opened in 1825, was in the first place a railroad for the transport of coal, and passenger traffic was at first regarded more or less as an afterthought.

The Liverpool & Manchester, then, was in reality the first "trunk" line, since it was built to link two great centres of population and not merely a group of collieries and wharves (although none would seek to diminish the immense importance of the Stockton and Darlington, it must be remembered that the Liverpool & Manchester was planned as much as a passenger undertaking as a freight route, and as such can claim to be the first trunk railway in Europe.)

Monopoly, with which many evils are traditionally associated, was the principal cause of the creation of the Liverpool & Manchester line, its case providing an apt illustration of the good which cometh oft from



EARLY SCENE ON THE LIVERPOOL AND MANCHESTER RAILWAY.
GOODS TRAIN PASSING UNDER THE RAIN HILL BRIDGE. LOCOMOTIVE "PLANET".
(From a Print lent by Mr. J. E. Kite).

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evil. In this case it was a canal monopoly, for in the early decades of the nineteenth century the canal interests held a virtual monopoly of and exercised a stranglehold on all the traffic passing between the great port of Liverpool and the rapidly-growing manufacturing city of Manchester, the centre of the British cotton industry. All the cotton imported into Liverpool had to be taken to Manchester, 30 miles away, by canal, and the huge dimensions of the cotton traffic, coupled with a rapidly expanding general trade between the two points and a growing inefficiency on the part of the canals, swiftly precipitated a condition of chaos for which there was only one remedy—the construction of a railway.

In 1824, therefore (one year before the opening of the Stockton & Darlington Railway) the traders of Liverpool and Manchester promoted a railway between the two cities, and in the face of strenuous opposition from the canal proprietors and from other landed and vested interests, succeeded in obtaining Parliamentary powers for the railway in 1826. The story of the battle which preceded the granting of these powers would make a long and exciting one if told in full, for not only was there much diplomatic manoeuvring behind the scenes, but actual physical skirmishes between the railroad surveyors and gamekeepers and others sent out with a view to preventing a survey for the line being made.

Prior to the actual construction of the line, which was undertaken by George Stephenson, there was a protracted discussion among the promoters as to the exact motive power to be used. One section advocated locomotives, which were then mainly in the experimental stage, while another regarded a system of stationary engines and cables as being the only practicable means of locomotion. George Stephenson himself upheld the advantages of the locomotive, as is only to be expected, and at his invitation a party of the directors visited the North of England and inspected, among other locomotives, that which Stephenson had built for the Stockton & Darlington.

The question was finally settled, however, by the holding of the famous Rainhill Trials of 1829 (which were dealt with in the Society's BULLETIN No. 20) and which provoked enormous and justifiable interest at the time.

Political, legal and locomotives difficulties overcome, there remained a number of stiff engineering problems which the construction of the line presented. These involved taking the line of railway across the notorious Chat Moss, a bleak and barren bog which subsided so repeatedly and which sucked down so much material that it was likened by Stephenson to "a giant sponge." Stephenson's ingenuity conquered even this obstacle, however, the sponge-like nature of the bog being overcome by carrying the line across it on a carpet made of hurdles interwoven together. The other engineering features included a viaduct across the Sankey Valley, a cutting (Olive Mount) two miles in length, and a tunnel over 2,000 yards long in the heart of the city of Liverpool. There were in all 63 bridges.

After several preliminary and successful trial trips the Liverpool & Manchester line was formally opened throughout on September 15th,

1830, and though the opening was from a railroad point of view successful it was not unattended with unfortunate incident, for Mr. Huskisson, one of the Liverpool Members of Parliament, was knocked down and fatally injured by the locomotive "Rocket" while in converse with the Duke of Wellington. There was also a popular demonstration against the Duke of Wellington, directed by a section of the many thousands of spectators who attended the opening, while one of the trains ran over a wheelbarrow which had been maliciously placed on the line, but fortunately without any untoward consequences.

Eight trains were run on the opening day, and the public time-table which came into operation the following day provided for about seven trains each way daily, the distance of 30 miles being covered in about two hours, inclusive of stops.

So began the first of Britain's trunk railways. From the first it was a financial as well as a practical success, the volume of passenger traffic in particular exceeding all anticipations.

The subsequent history of the line may briefly be described. Following its successful inception branches were made to certain neighbouring towns, either by the Liverpool & Manchester or by private companies operating in conjunction therewith, while the Liverpool & Manchester itself built local extensions in both the principal cities which it had been built to serve.

In 1845 the Liverpool & Manchester Railway became amalgamated with the Grand Junction Railway, and this company a year later merged itself with the London & Birmingham and the Manchester and Birmingham Railways to form the London and North Western Railway, which came into being by an Act of Parliament dated 1846. The London and North Western in later years established and maintained the reputation of being the premier railway system in Britain, and its great traditions are now carried on by the London, Midland and Scottish Railway of England, which was created by the great amalgamations of 1921-23 and whose principal constituents were the London and North Western, the Midland, and the Caledonian and other Scottish Railways.

So much for a historical sketch—all too brief in such limited space—of the Liverpool & Manchester line, which is still after a hundred years one of the most important and most notable, albeit one of the shortest main trunk routes in Britain.

The original permanent way of the Liverpool & Manchester consisted of fish-bellied iron rails weighing about 35 lbs. to the yard (English measurement), but before many years passed heavier metal was substituted and the original stone-blocks which supported the rails were superseded by wooden sleepers.

Space does not permit of anything like a detailed history of the locomotives used in the early years of the Liverpool and Manchester Railway, so we must be content with a few notes on those in use when the line was actually opened.

The first eight engines were all of the single-driver type with a trailing axle, built to the designs of and by George Stephenson, and all were modelled on the famous Rocket (No. 1 of the Liverpool & Manchester

Railway) which was the winner of the Rainhill trials (1829) and which now occupies an honored place in the Science Museum at South Kensington, London.

The other seven engines were named Meteor, Comet, Arrow, Dart, Phoenix, North Star, and Northumbrian, of which the first four had cylinders 10 by 16 (Rocket being 8 by 17) and the last three cylinders 11 by 16 inches.

Considering the difficulties under which they were built and operated the performances put up by these early engines of Stephenson's were extraordinarily good, and although the Rocket is the only one of their number now preserved, the names of some of the others and of other early Liverpool and Manchester engines have been commemorated by the London, Midland & Scottish Company, many of whose latest 6100 class ten-wheeled "Royal Scot" type express locomotives now bear the honored names of these pioneer locomotives.

From Our Members

Mr. Frank E. Gill, of Portland, Oregon, has called our attention to some errors that appear in BULLETIN No. 17.

"First, referring to the article—'The Beginning of the Southern Pacific,' commencing on Page 47, statements in the second paragraph are not within the facts to the extent that there were fourteen miles of railroad in operation in Oregon from April 20th, 1863 and there had been for about a year previously a railroad six miles long in operation between Bonneville and Cascade Locks, the first mentioned line between the Dalles and Celilo. It is also incorrect to say, that one company . . . had graded a few miles within the vicinity of Portland. The fact is that sixty miles had been graded by one company and twenty miles by another before December, 1869. It was the road with sixty miles of grade that managed to complete twenty miles of track by December 24, 1869."

Mr. C. F. Dendy Marshall has also forwarded some interesting comments on the first twenty bulletins issued by the Society which are too long to be reproduced herewith. In this connection, we are always glad to receive comments and criticism, if available for publication in our bulletin. Historical research is not easily obtainable and our members are sincere in their belief that their contributions are correct so far as the data is concerned. Some of the best known authors have been known to err and the elimination of errors we try to reduce to a minimum.

Mr. W. M. Spriggs of St. Anne de Bellevue and Mr. R. R. Brown of 700 St. Catherine St. West, Montreal, have requested that if any of our members have any data relating to early Canadian railways or locomotives they would like to hear from them. Our Canadian members have contributed some interesting papers to this Society and they deserve our help and support.

Incidents in English Railway History

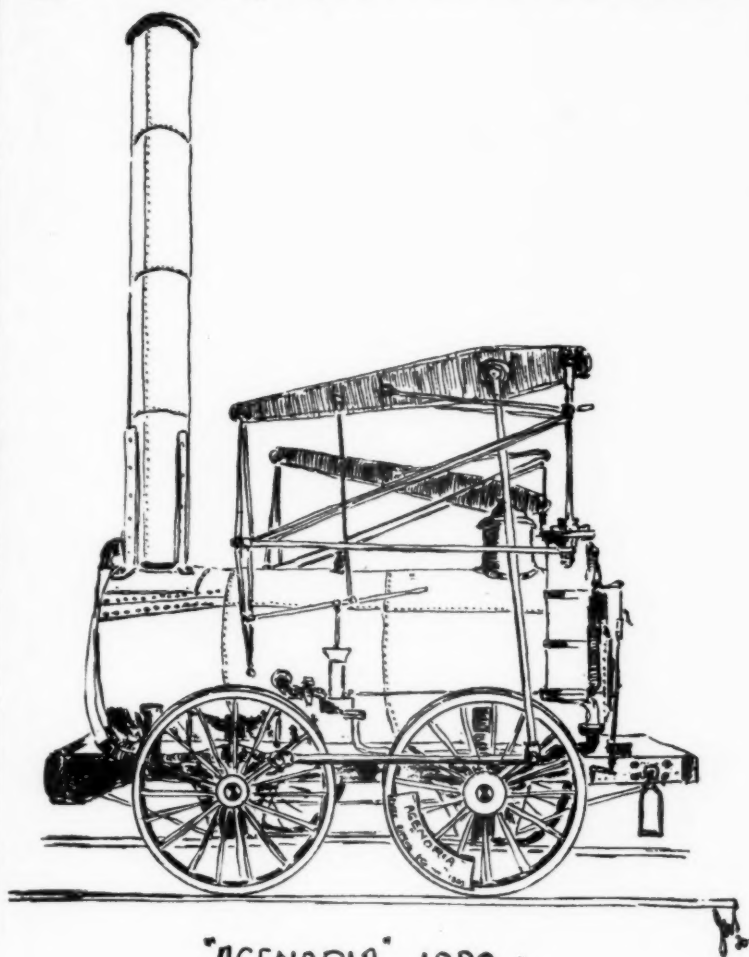
By G. W. BISHOP

THE first traveling Post Office ran upon the London and Birmingham Railway, in 1838. This was a 4-wheeled vehicle with the "stage-coach" outlines of the period, and bearing the Royal coat-of-arms. A device was fitted for collecting and delivering mails whilst running, the invention of Mr. J. Ramsay, afterwards superseded by another scheme devised by Mr. N. Worsdell. The carriage weighed only about nine tons, and the speed was low, with four intermediate stops between London and Birmingham, about 112 miles. The staff comprised one or two clerks and a guard, the latter wearing a frock coat and top hat; his duty was to secure and exchange the mail bags as required. Two journeys were thus made daily. Bradshaw's Guide of 1839 (the first issue) shows that on this route there were 9 trains each way daily, the 1st. class taking 5 hrs. 15 mins., "mixed" 1st. and 2nd. class 5 hrs. 30 mins., and 3rd. class 8 hrs. 45 mins. The horse coaches of the period performed the journey in 10 hours. The 1st. class trains consisted of "mail" carriages carrying 4 inside, and others carrying 6 inside; "mixed" trains had 1st. class carriages (6 inside), and 2nd. class open at the sides; 3rd. class trains had merely open trucks with seats. One train each way was run at a penny a mile, known as the "Parliamentary." The term arose from a clause in the Parliamentary Railway Bill, and survived for some time after.

Speeds were so low upon the Bodmin and Wadebridge line, opened 1834, that a boy rode in front of the engine in order to open the gates at the grade crossings, of which there were 13. This boy was named Samuel Worth, and worked on the line for 61 years, until it was taken over by the L. & S. W. R. Passengers were picked up or set down as the train proceeded, similar to a tramway. Indeed, in early days, railway carriages were often used in this way, as there were no platforms at roadside stations, and passengers entered or alighted on either side as they thought fit. They also attempted to get on or off while the trains were moving, sometimes in order to recover their hats, which had blown away from open carriages.

An interesting example of a Royal railway journey took place in October, 1852, when Queen Victoria, Prince Albert and the Prince of Wales traveled from Balmoral to Windsor by an unusual route. The first stage of the journey, on Oct. 12, was to the Britannia Bridge, over the Menai Straits, which had just been opened, and from thence to Bangor. Next day the Royal train proceeded via Shrewbury and Wolverhampton to Birmingham. At that City the train ran over the Midland Railway to a point near Bordesley, where the newly-constructed broad gauge line of the Great Western Railway passed under the Midland Railway embankment. Here suitable platforms connecting the two lines had been erected, and the Royal party was thus able to walk down to a broad gauge train that was waiting in readiness to proceed to Windsor. The Royal saloon on the G. W. R. was fitted with a disc signal on the

roof, so that instructions to reduce speed could be conveyed to an official who rode in a shelter at the back of the locomotive tender. Later on a junction line was made at the point mentioned, and is said to have been used by a train conveying King Edward from Windsor to Chatsworth.



"AGENORIA" 1829.

The first locomotive to run in the Midland Counties appears to have been the "Agenoria," built by Foster, Rastrick & Co., at Stourbridge, in 1829. The first trip was made on Tuesday, June 2, 1829, over the

Shutt End Railway, a line made for coal traffic, connecting the Earl of Dudley's Colliery at Kingswinford with the Staffordshire and Worcestershire canal at Ashwood Basin. A great crowd gathered to witness this event in the history of the "Black Country." The engine drew a load of 130 tons at $3\frac{1}{2}$ miles per hour, whilst engine and tender alone attained a speed of 11 miles per hour. The permanent way was of wrought iron, with cast-iron chairs and wooden sleepers. The engine worked for 35 years on this line, and is now at South Kensington Museum. The "Agenoria" is of special interest, being of similar design to the "Stourbridge Lion," which has received much attention, as indicated in BULLETIN No. 20. The only important difference lies in the very tall chimney fitted to the "Agenoria," probably to lessen the noise of the exhaust. The excellent service rendered by this engine shows that the design was capable of satisfactory work under suitable conditions. The sketch of the engine is by Mr. J. W. Smith.

G. W. BISHOP.

A Brief History of the New York & New England R. R.

By GEORGE M. WOODRUFF.

IN the Railroad Commissioners' Report for 1879 of the State of Connecticut will be found the following condensed sketch written by Mr. Woodruff who at that time was one of the three Railroad Commissioners of the State of Connecticut.

In this report will be found a statement to the effect that it was the purpose to present a history of these early railroad enterprises in this State before the men who were active in these enterprises passed away. The recent transfer of the Hartford, Providence & Fishkill R. R. to the New York & New England, thus making it the largest railroad operating in the State of Connecticut was the reason this road was first selected. Subsequent reports show that this idea was not carried out, but we are fortunate to have this sketch preserved for us which will probably be of interest to our readers.

"The earliest movement towards what afterwards became the Hartford, Providence & Fishkill R. R. seems to have been the incorporation by the legislature of Connecticut of "The Manchester Railroad Company," with authority to construct a railroad "from the City of Hartford through East Hartford and Manchester to a notch in the mountain in Bolton, and to or near the stone pits or quarries in the towns of Bolton and Vernon, in the county of Tolland." No organization was effected under this charter, and the next movement was toward the west. In 1845 "The New York & Hartford Railroad Company" was incorporated by the legislature of Connecticut, and the same year a survey was made for the contemplated "New York & Hartford Railroad via Danbury" by Mr. Edward H. Broadhead, between Hartford and New York State Line. His report was printed in connection with a report by a committee consisting of Messrs. James Goodwin, Edmund G. Howe, and Egbert Cowles. The report was very elaborate, and contained full statistics and estimates of business on the several routes surveyed. These gentlemen estimated the yearly number of passengers between Hartford and the State Line as 80,000, and the freight tonnage as 40,000, which has proved to be about the proportion of passengers to freight on the line as long as worked between Providence and Waterbury. In March, 1848, the legislature of New York passed a general railroad law, and in April of the same year, an act to the effect that a railroad from some convenient point at or near Fishkill Landing to the east line of the State, and as nearly east and west as the face of the country would permit, would be of sufficient public utility to justify taking private property, and authorized certain gentlemen to take proceedings to form a corporation under the act. These gentlemen reported in print, Dec. 1848, showing estimates of business, deduced from the before-named Connecticut report of 1845, equivalent to about 160,000 passengers and 85,000 tons of freight yearly over the whole line from Providence to Fishkill. Three-

fifths of that line from Providence to Waterbury, 122.365 miles in use since January 1855, has as yet, only acquired a business equivalent to about three-quarters of what was in 1848 estimated for the whole line from Providence to Fishkill. These gentlemen looked on coal only as a possible source of business, and made no account of it in their estimates; but they gave attention to the subject, and noted that its use had increased from 365 tons in 1820 to nearly 3,000,000 tons in 1847, and estimated 5,000,000 tons in 1848, for the then 20,000,000 population in the United States, and argued from all past experience that it would reach 15,000,000 tons by 1869, and from British statistics, that 1 1/6 tons per head of the population might be expected in the near future. In this connection it is interesting to observe that in 1877, the latest available return, the whole quantity moved was 54,000,000 tons, or nearly 1.4 tons per head of the population.

"In 1847, the powers and privileges conferred upon the Manchester Railroad Company were revived, and the new company was authorized to construct a road to Willimantic, with a branch to Rockville, and to assume the name of the "Hartford & Providence Railroad Company." In December of that year, the late James Laurie, C. E., reported in print to Messrs. Brown & Ives of Providence, R. I., on surveys made by him for the Providence & Plainfield Railroad, a Rhode Island enterprise, including a branch from Frozen Point (River Point), in the town of Warwick, R. I., up the north-west branch of the Pawtucket River, about three miles, to Hope Village. In 1848, the Hartford & Providence Railroad Company was authorized to bridge the Connecticut River and to extend their road from Willimantic through Plainfield and Sterling to meet the Providence & Plainfield Railroad. The same year the New York & Hartford Railroad Company above spoken of was united and merged in the Hartford & Providence Company; the company after the merger to be entitled "The Hartford, Providence & Fishkill Railroad Company," and to be authorized to build a railroad 'between the east and west lines of the State.'

"In 1848, construction between Hartford and Willimantic was actively pressed, and this portion of the line was opened in 1849; that from Hartford to Bristol was opened the next year. The union of the Hartford, Providence & Fishkill Railroad Company with the Providence & Plainfield Railroads, made in 1851, was validated and confirmed by the Legislature in 1852. The road from Willimantic to Providence was opened in 1854, and the remaining portion, Bristol to Waterbury, in 1855. No further work of construction was undertaken by this company, but in October, 1852, the whole route from Providence to Waterbury having been definitely located under Samuel Ashburner, C. E., the engineer-in-chief, the company, with a committee of the citizens of the State of New York, undertook surveys for extending the road from Waterbury to the Hudson. This work was under the charge of Samuel Nott, as engineer, and the country between Litchfield on the north, and Danbury on the south, was examined and surveyed. The report on these surveys gave preference to the southern route, which was the one upon which the work hereafter spoken of as done by the Boston, Hartford &

Erie Railroad Company was performed. The earnings of the road proved insufficient to pay the interest on its bonds, it was then with its meagre appointments on the first of February, 1858, surrendered to the Trustees of the bondholders, by whom, under the superintendence of Mr. Nott, it had been operated with marked safety and regularity for more than twenty years, till surrendered to the New York & New England Company, on the 18th of October last (1878). More than half of the line probably yielded but little above the cost of operating, yet the gross annual income rose from \$300,000. or only about \$2,500. per mile, to \$1,065,000, or about \$8,000. per mile in 1873. The lowest income since 1868 was for the past fiscal year, \$838,000. or about \$6,500. per mile operated, and was never more than one-quarter of the rate of the New York, New Haven & Hartford Railroad. Under the management of the Trustees the bonds rose from about 30 per cent. to 108. During their management many additions and improvements were made, and the whole line kept in good and constantly improving condition, and the Trustees are to be complimented on the state of the property they have now delivered over, and on their management thereof.

"The New York & New England Railroad, as at present existing, is the result of the union of many railroads, organized at different times and for different purposes; some being started for purely local purposes, and others originally intended for through lines. The different divisions of the road were begun independently, generally between the years 1844 and 1848. The oldest charter of any portion of the line is that of the Manchester Railroad Company, as before stated, and the growth of that company into the Hartford, Providence & Fishkill Company has been given above.

"The Woonsocket Division of the New York & New England was acquired in 1865 by the Boston, Hartford & Erie Railroad Company, by a union with the New York & Boston Railroad Company. This latter company originated in Middletown, Connecticut, and the first charter granted was to the Middletown Railroad Company, with authority to construct a road from Middletown to New Haven. At this time there was great interest in regard to the construction of a through "Air Line" route between Boston and New York, and in 1846, the New York & Boston Railroad Company was chartered for this purpose, having authority to construct a road from New Haven through Middletown to the east line of the State towards Boston. This company was united with the Woonsocket Union Railroad Company in 1853, and thus obtained the right to extend its road across the northwestern corner of the State of Rhode Island to the State Line of Massachusetts. In 1855 it was united with the Charles River Railroad Company, having the right to construct a road from Brookline to the Rhode Island State Line, and having completed a road as far as Needham. The New York & Boston Railroad Company finished its road from Brookline to Woonsocket, and when the road was united with the Boston, Hartford & Erie Railroad Company this road came into the possession of the latter company, and has since been and is now run under the name of the Woonsocket Division.

"That part of the New York & Boston road which was located in Connecticut was not completed within the time required by the charter, and all rights under it were lost. It was subsequently completed by another corporation between New Haven and Willimantic, and is now owned and operated by the Boston & New York Air Line Railroad Company.

"That portion of the New York & New England Railroad which extends from Boston to Willimantic, originated in 1846, when the Walpole Railroad Company was incorporated with the right to construct a road from Dedham to Walpole, a distance of about eight and one-half miles. This company was consolidated in 1847, with the Norfolk County Railroad Company, which had the right to construct a railroad from Dedham to Blackstone, which it built, and in 1853 was merged with the Midland Railroad Company (having authority to build a road from Dedham to Boston), and the Southbridge & Blackstone Railroad Company (having authority to construct a road from Blackstone to Southbridge), the consolidated company taking the name of the Boston & New York Central Railroad Company. This company completed its road from Boston to Mechanicsville, where connection was made with the Norwich & Worcester Railroad. Through connection was made to New York by this route for about two weeks. The company then ran short of funds, failed to pay the interest on the bonds secured by a mortgage on the Norfolk County Railroad, the Trustees under that mortgage took possession of their portion of the road, and the whole road was thereafter run in sections until 1866, when it was again united under the Boston, Hartford & Erie Railroad Company. The property had in the meanwhile passed through the hands of another Midland Railroad Company, the Midland Land Damage Company, and the Southern Midland Railroad Company.

"The Boston, Hartford & Erie Railroad Company was incorporated in 1863, by the legislature of Connecticut, the charter having the following preamble:

'Whereas, By grants heretofore made to sundry railroad corporations, this State has declared her desire and policy to be that railroad communication shall be opened through the central portion of this State, extending to and connecting with the Erie Railroad at Fishkill on the west, and the harbor of Boston and the city of Providence on the east; and whereas there still remains some portions of said line to be constructed, which unbuilt portion the present grantees of power to build have been unable to finish; and whereas there is good cause to believe that, under one corporation, said line can be completed, and so answer the end and purpose of the creation of several corporations: therefore, etc.'

"From the above it is apparent that the legislature of Connecticut intended that the Hartford, Providence & Fishkill Railroad Company should become the property of the Boston, Hartford & Erie Railroad Company, in the hopes that the latter would finish the road to the Hudson River, and thus carry out the original intention in regard to that property. And one of the first acts of the Boston, Hartford & Erie Railroad Company was to purchase of the stockholders of the Hartford, Providence & Fishkill Railroad, their right in the road in cash and by the exchange of stock, under an agreement made by the two corporations by

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vote of the stockholders of each, but not having paid the underlying mortgage bonds, they did not obtain possession of the property; some of the stockholders also refused to transfer their stock.

"Work was begun upon the road from Waterbury to the Hudson River, and it was partially constructed, over three millions of dollars being spent upon it.

"The Boston, Hartford & Erie Company also purchased the franchise and property of the Southern Midland Company and of the Thompson & Willimantic Railroad Company. It then completed the Southbridge branch, paid off the Norfolk County bonds, and ran the road from Boston to Putnam and Southbridge, and began the construction of the road from Putnam to Willimantic, which was completed by that company and opened in 1872.

"A Mortgage to secure bonds to the amount of \$20,000,000 was made by the Boston, Hartford & Erie Railroad Company to Robert H. Berdell, and others, trustees, dated March 19, 1866, which was a lien upon a line of railroad extending from Boston and Providence through Willimantic to the Hudson River, and from Brookline, near Boston, to Woonsocket, R. I., with branches.

"The Hartford, Providence & Fishkill road was included in and covered by the Berdell mortgage, but it was subject to a first mortgage made by the Hartford, Providence & Fishkill Railroad Company, the trustees of which had taken possession for default in payment of interest on the first mortgage bonds, and were operating the road.

"In 1870, the Boston, Hartford & Erie Railroad Company failed to pay the coupons on the bonds secured by the Berdell mortgage, and receivers were appointed who took possession in August, 1870, and held possession for one year. In August, 1871, the trustees under the Berdell mortgage took possession of the road and foreclosed the mortgage, and the title to the property covered by it then vested absolutely in the bondholders, including, as is claimed, the right to redeem the first mortgage bonds of the Hartford, Providence & Fishkill Railroad Company.

"On the 17th of April, 1873, a meeting of the bondholders was held, and a corporation organized taking the name of the New York & New England Railroad Company. The proceedings whereby it was formed were ratified by the legislatures of Massachusetts, Connecticut, Rhode Island and New York the same year, and authority given the new company to mortgage its railroad, property, and franchises in a sum not exceeding \$10,000,000. The capital stock of the company is \$20,000,000, and is issued only in exchange for the Berdell bonds.

"The property held by the trustees under the Berdell mortgage was transferred by them to the new company by deed in July, 1875, and it has since been in their possession and control.

"To make their title absolutely beyond question, the New York & New England Railroad Company also purchased of the assignees in bankruptcy of the Boston, Hartford & Erie Railroad Company all rights of redemption by that company, and all stock and bonds of pre-existing companies held by it.

"The New York & New England Railroad Company also came into control of the Norwich & Worcester Railroad, extending from Worcester to Allyn's Point under the terms of a lease for 99 years made to the Boston, Hartford & Erie Railroad Company; this lease giving the New York & New England Railroad Company the control of a line of steamers running from Norwich, Allyn's Point, and New London to New York, the Norwich & Worcester Railroad Company owning a majority of the stock of the steamboat company.

"Last winter the company made application to the State of Massachusetts, which is the holder of \$3,600,000 of stock of the company, to issue scrip to the amount of \$6,000,000, the proceeds to be devoted to the purchase or discharge of all of the indebtedness of the company, or to which any of its property was subject, and to the completion of the road to the Hudson River, and to the equipment of the road, taking \$9,000,000. of the company's first mortgage bonds as security. This proposition was declined. During the fall, however, private parties were found to take a sufficient number of the bonds, and availing itself of the right acquired by the Berdell mortgage, and enforced by decree of the court, the company paid off the first mortgage bonds on the Hartford, Providence & Fishkill Railroad, and on the 18th of October, 1878, took possession of that property, and then for the first time came into complete control of its entire road.

"It now owns and operates two hundred and sixty-one miles; it leases and operates eighty-nine miles; in all, three hundred and fifty miles of completed road, and one hundred and twenty-five miles of steamboat line; and also owns about seventy-five miles of roadbed, two-thirds completed, between Waterbury and the Hudson River. And as it is probable that work will be resumed on the unfinished line west of Waterbury in the early spring, it will be seen that the New York & New England Railroad Company may, and indeed must, be of great importance to the State of Connecticut, if the interests of our people are properly consulted.

"And though in granting the charter of the Boston, Hartford & Erie Company, the legislature did declare the policy and desire of the State to be that railroad communication should be opened through the State between the Erie Railroad and the harbors of Boston and Providence, it was that we might be, at least, equal sharers in the advantages gained, and not only or chiefly for the benefit of the company or the cities named."

Mr. Woodruff at the close of his sketch acknowledges the assistance of Mr. Samuel Nott, late Superintendent of the Hartford, Providence & Fishkill Railroad Company and Mr. James W. Perkins, Secretary of the General Manager of the New York & New England Railroad Company.

(Original, unpublished.)

The Little Locomotive With the Big Smokestack

To the Engine "Pioneer," the first locomotive to come to Chicago, in 1842, to operate the Galena & Chicago Union Railroad, the first line in the State of Illinois.

Now where Chicago burns to-night her thousand lamps aglow,
And her shadows on Lake Michigan in silver currents flow,
I can see those tinselled waters long before the arc-light came,
When the Dearborn shores were dotted with the gas-lamp's amber flame.
So pictured in my fancy is the wending wagon train,
And the log-hut by the forest and the teepee on the plain;
And the engine with the funnel on the timber trestle high,
Like the first that fired a cinder on the plains of Illinois.
That bore the doughty pioneers that made a nation grow,
Where the Sioux roamed the prairie, and the lordly buffalo;
In the days of early venture from our triumphs looking back,
To the little locomotive with the big smokestack.

Where bold Columbus set his gaze the sun set calm and clear,
In the vast and vacant vista that his sailors faced in fear.
But its shadow shed before him on the evening ocean lay,
Like a golden path to guide him on his long mysterious way.
Then, so inspired, he followed o'er that wondrous western sea,
With the sun of promise smiling on the waves of destiny;
As it led the world for ages, and the legions in his line.
From the dormant vales of Europe, and the Liffey and the Rhine.
Who reared us to an empire over all that left their names,
From the Tigress to the Tiber, from the Tiber to the Thames.
So I dream of days romantic, from our triumphs looking back,
To the little locomotive with the big smokestack.

Montreal.

JOHN LOYE.

Chevalier de Gerstner

FRANZ ANTON RITTER V GERSTNER.

Born at Prague, May 11, 1793.

Died in Philadelphia, April 12, 1840.

IN the Laurel Hill Cemetery, in Philadelphia, lies the remains of Chevalier de Gerstner. The grave is located not very far from the office and is marked by a large granite slab, lying flat, which bears the simple inscription—"Francis Anthony Chevalier de Gerstner April 12 1840."

From the pages of the *Albany Argus*, Dec. 12, 1844, we find an interesting account of this man. Those of our members who wish further

information as to his history are referred to the "American Railroad Journal and Mechanics Magazine—May 15, 1840" and in the same paper for August 15, 1840 appears a contribution by Mr. Klein, his Secretary, on the Russian railroads constructed by de Gerstner.

A handsome portrait of this man hangs on our walls in the Baker Library and his life should be of interest to all of our members.

THE FIRST RUSSIAN RAIL-ROAD—THE CHEVALIER DE GERSTNER, THE ENGINEER.

The first rail-road constructed in Russia was from St. Petersburg to Zarscoe-Selo* and Pawlowsk, a distance of 17 miles. It was commenced in 1836 and completed early in 1838, under the direction of F. A. Chevalier de Gerstner, a distinguished Austrian Engineer.† The funds were obtained partly by a loan from the Emperor, 1,500,000 rubles, and the balance made up by subscription from a joint stock company, by whom the work was undertaken. It was regarded as a hazardous and visionary project, and a total failure confidently predicted. The capitalists who embarked in it were by no means sanguine of a profitable investment of their funds, and nothing but the profound scientific and practical knowledge of the indefatigable Engineer, could have conducted it under the circumstances to anything like a favorable termination.

The severity of the climate—the intense frosts and deep snows of winter—were obstacles which may readily be imagined were considered insurmountable. The embarrassments in the way of conducting rail-roads from these causes, in milder latitudes, have constituted serious objections, and are still the occasional sources of delays and interruptions. The plan of this road was designed to obviate these difficulties. The track was elevated an average height of 10 ¼ ft. above the surface of the ground, on an embankment formed by the excavation of parallel side ditches, and a space of 420 feet in width, cleared of timber when the route lay through the forest, to admit the full benefit of the wind in clearing the road of snow. The top of the embankment at intervals where the cross timbers of the superstructure occurred, was covered with stone ballast, 15 inches deep, to prevent the heaving of the frost, and all moisture removed as far as practicable by drains and the ample side ditches at the base of the embankment. The face of the country was generally favorable to this mode of construction, and it will appear at once to be the most feasible, simple and practicable mode that could have been adopted.

The cost of the road, including fixtures, carriages, locomotives, depots, etc., was 524,400 rubles. The receipts from passengers and freight from 1st April to 31st Dec. 1838, were 798,000 rubles. The expense of working the road and repairs for the same time 313,000 rubles.

From this data (all that we have of an authentic nature) some idea may be formed of the success which attended the enterprise. The subsequent measures of the Emperor Nicholas in extending the work is a further indication of the satisfactory results attained by its construction.

The able engineer, de Gerstner, soon after the completion of this road, was permitted to leave the dominions of the Emperor without any engagement having been made for his future services. He came to this country in the fall of 1838, on a professional tour, and after having visited all the principal railroads and canals in the United States, and collected a fund of useful information and valuable data, died in Philadelphia in 1840, about one year after his arrival. His notes and observations on our works of in-

*Zarscoe-Selo; literally, the residence of the Czar.

†Chev. de Gerstner had charge (in 1824) of the first railroad on the continent of Europe, to connect the rivers Moldau and the Danube, in Austria, by a line 130 miles long; since completed, and in operation in 1832.

ternal improvement (more extended and minute than any that have been hitherto made by any one of our own citizens,) with the exception of a few articles that were published before his death, are lost to the scientific world—a loss the more to be regretted, as they were made by a practical and discriminating mind, eagerly bent upon the pursuit of knowledge, and qualified in no ordinary degree to acquire it. His affable and unostentatious deportment, his scientific attainments and extensive professional knowledge and experience, together with an inquiring and communicative manner, rendered the brief acquaintance which his friends were privileged to enjoy with him here, one of unabated interest and instruction. The facilities that were afforded him in pursuing his investigations in this country, bespeak in a gratifying manner the hospitality and courtesy, as well as discernment, of our countrymen. That they were well bestowed and appreciated, we have the evidence in his own language. Writing to the editors of the Railroad Journal, during his tour, he says: "I have already passed over more than 2000 miles of railroads, and have everywhere been received with the greatest kindness; the presidents, directors and engineers of the different railroad lines gave me not only all their printed reports, but laid before me, with the greatest liberality, their books and accounts, in order to give me every kind of information.—I fulfil only my duty when I publicly acknowledge that such liberality is only to be found amongst a free and enlightened people, where all public works are based on the principle of publicity, and where secrets do not exist."

Having completed his tour in a successful and satisfactory manner, and gleaned from our public works a mass of useful, intricate and detailed information, such as a comprehensive mind like his could not fail to acquire under the circumstances, this accomplished foreigner, engineer, and "savan," died in the city of Philadelphia, when about making arrangements to re-embark with his valuable freight to Europe. His papers, together with his other effects, it is understood, were placed in the hands of a friend to convey to his family. Nothing has since been heard of them, and it is probable that they still remain (if preserved) in the imperfect state in which they were left at his death.

The Emperor Nicholas, in carrying out the plan that had been partially formed during the construction of the Zarscoe-Selo railroad—that of extending the line to Moscow—turned his attention to the United States for the selection of a competent engineer to take charge of the work.

Maj. Whistler, formerly of the Topographical Corps, and engineer of the "Western Railroad," received the Imperial appointment as chief engineer of the great Russian Railroad between the cities of St. Petersburg and Moscow, in 1838, and sailed for Russia, where he has since been actively engaged in prosecuting the great enterprise.

G.

What We Can Do For Our Members

IN the past year this question has often been in the minds of some of the more serious minded men connected with this Society. With the varying temperaments and interests of our members, it is sometimes a difficult task to please all, though every member has realized that whatever he may suggest at any time, the matter will receive serious consideration.

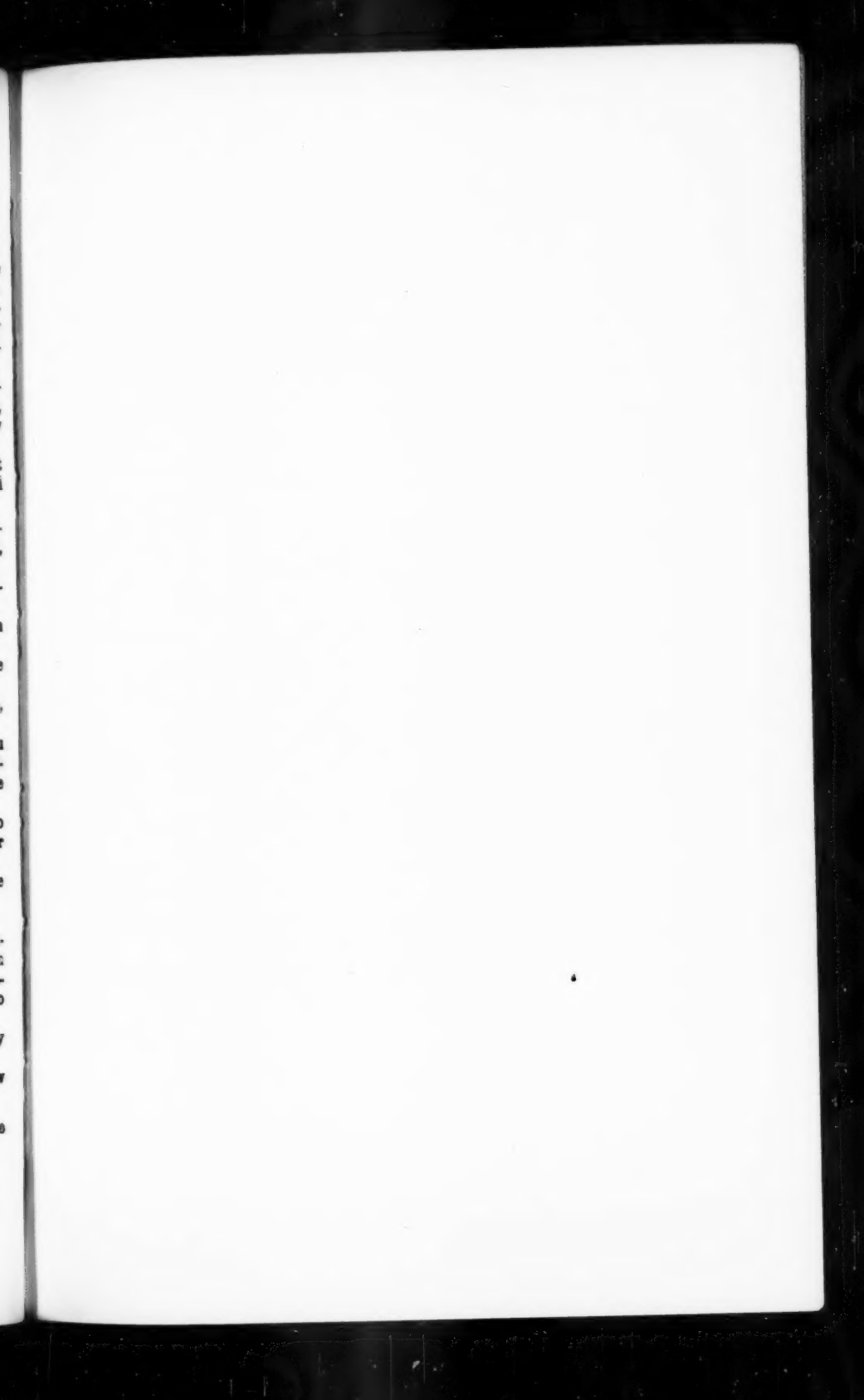
While those members living in the vicinity of Boston, see and receive the benefits derived from our connection with the Baker Library, the fact remains that the majority of our members live outside of New England and only a few in the immediate vicinity of Boston.

One of our members has suggested that a questionnaire be sent out to our members and the following questions are worthy of your careful consideration and on which a reply would be appreciated.

1. What interests you particularly—photographs, books, catalogues, railroad reports or time tables? Are they very old, modern or both?
2. Do you definitely collect photographs or other material relating to old or modern locomotives or railways?
3. Have you material for exchange? Will you give a description and also what you desire, stating first and second choice.
4. Have you any material that you would care to sell? If so, give a description and price.
5. Is there any material that you would care to purchase? If so, give description and the price you would be willing to pay.
6. Would you be willing to list approximately, the material you have, sending the list to the Society to be kept on file for reference, in case some other member has certain material, and he can be referred to the owner?
7. Have you any material which you would be willing to loan to the Society to be used in the preparation of bulletins or other publications of the Society?
8. Have you any material that you would care to present to the Society, to be retained for the mutual benefit of all members?
9. Can you devote any time to the Society? Will you do so?
10. What is your opinion of our Bulletins? What types of articles do you prefer—give specific article. Are you satisfied with the size, type and paper used? If changes were made increasing the size, the grade of paper, etc., would you be willing to give it your financial support? If so, to what extent?
11. What is your opinion of the photograph exchange the Society started two years ago? In what way can we improve it?
12. In what way can the Society be of more benefit to *you*, and how would you suggest that we can serve you better?

I will certainly appreciate it, if every member will take the trouble and advise me relative to any or all of these points.

CHAS. E. FISHER.

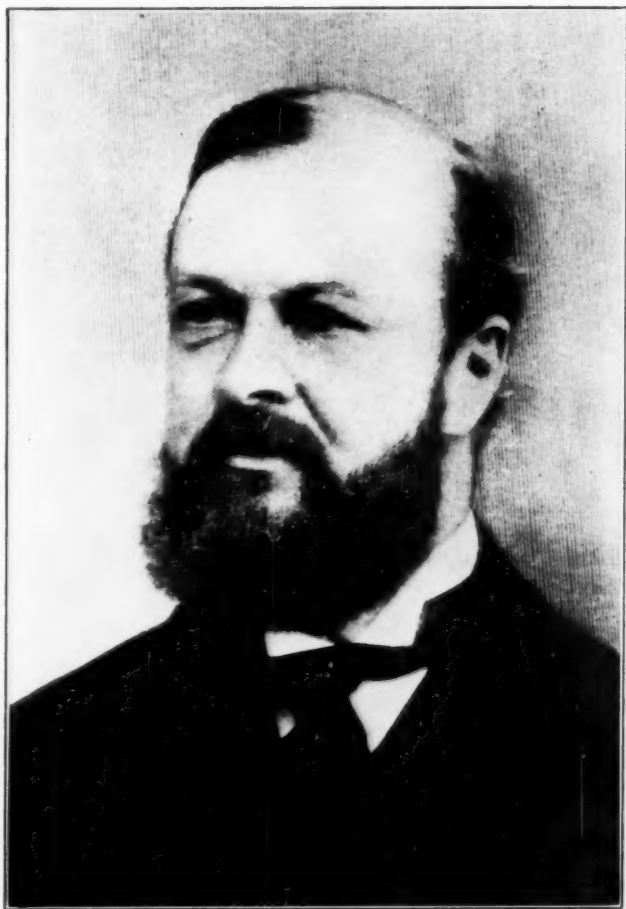


BULLETIN No. 23

TRANSPORTATION LIBRARY



**The Railway and Locomotive
Historical Society**



CHARLES MELVILLE HAYS

General Manager 1896-1901; 2nd Vice President and General Manager 1902-1910;
President 1910—April 15, 1912. Grand Trunk Railway System.

BULLETIN No. 23

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POSSIBLY our members may feel that this bulletin is devoted almost exclusively to Canadian interests. Mr. Breithaupt has at no little care and research presented an interesting history of the growth and development of the Grand Trunk Railway. Mr. Loye's contribution on motive power supplements Mr. Breithaupt's contribution and the two articles give our members an interesting history of a road which many of us will welcome. Mr. Brown, also of Canada, has again given us an interesting contribution.

To supplement the Boston & Albany R. R. material that appeared in Bulletin No. 22, the performance of the early locomotives on the Boston & Worcester R. R. of nearly one hundred years ago, should be of interest to our members. To keep the article well within our limits, only the more interesting items have been given, but it affords us a word picture of the trials and tribulations, and there were many, of operating the first railroad opened for service in the state of Massachusetts. Appended to this article is a list of corrections covering errors in Mr. Becker's contribution in Bulletin No. 22. It was with regret that some of the information was discovered after the bulletin was distributed and others were of a typographical nature. With these corrections, the list of locomotives is as near correct as can probably be produced at this late day.

To those of our members who took the time and trouble to answer the questions that appeared on Page 62 of Bulletin No. 22, the officers of

this Society wish to express their sincere thanks. The replies received show that the writers are interested in what this Society is trying to accomplish and it is only from our members that we can learn if we are meeting your expectations. Many of the suggestions made should be of interest to our members and as rapidly as possible they will be carried out. One member, for example, has suggested that we give space in this bulletin as sort of a clearing house for books that he wishes to purchase or exchange. Although but two replies were received in connection with the notice that appeared in Bulletin No. 21, we will gladly list any of the wants of this nature that our members may desire and will you please forward them to the Editor.

One of our members whose duties call him to different parts of this country has been the means of arousing no little interest in the members of the same community. Very shortly our members will receive a list of our members who live in their section of the country and for those who desire a complete membership list as of March 31st of this year, may have one for the asking. Our member who has made these visits reports that many of our own members were surprised that there were so many others living in their vicinity. The Secretary of this Society or your own Representative will always gladly give you information in regard to our membership.

The Society would like information and data relating to William H. Brown, author of "History of the First Locomotives in America." Mr. Brown drew many silhouettes of individuals and the Society would like information covering his work in this respect and if possible to obtain a picture of Mr. Brown himself.

Also, the Society would like to obtain a likeness of Mr. E. L. Miller, a man prominent in the venture of the South Carolina Canal and Railroad Company. If any of our members can give us any assistance in either of the above, it will be deeply appreciated.

Mr. C. O. Becker, Fieldhead, Myddleton, Ilkley, England writes that he would like to procure copies of the Baldwin Quarterly Magazine for October 1922 and April 1924. He offers in exchange October 1925, January 1926, July 1926 and October 1926 numbers.

At the meeting of the Directors of this Society held in the Baker Library on September 14th, it was voted to accept the resignation of Mr. C. L. Winey, as Director, due to his ill health.

The Directors confirmed the action of releasing Mr. E. A. Preston

as Executive Secretary, transferring the most necessary of his activities to other officers of the Society.

It was voted to continue the present membership dues for 1931. The Annual Membership fee will be \$3.00 and will include the two bulletins containing miscellaneous material. The Contributing Membership fee will be \$25.00 and include all bulletins issued during the current year. With the Life Membership fee of \$100.00, it was voted to include all future bulletins upon payment of this fee. Those who are already Life Members will be included upon payment of the difference of the former Life Membership fee and the present life membership rate.

In connection with some of the suggestions received from some of our members, an arrangement has been made with the Baker Library authorities whereby some of the books owned by the library will be available to our members. This will not include books in constant use. To list the books which might be of interest to our members would be impossible in our bulletin and it is suggested that our members who wish this service address their letters to Dr. Arthur H. Cole, Administrative Curator, Baker Library, Harvard Business School, Boston, Mass., stating the book or books they wish to borrow. Upon receipt of their letter, they will be advised if the book is available and arrangements will be made to forward you the book through your own local library who will notify you of its receipt. Members using this service are requested to return these books promptly to their own local library not keeping them over two weeks. The success of this plan will depend upon the use our members make of it and returning the books promptly and at the time stated.

The Los Angeles Museum of History, Science and Art at Exposition Park, Los Angeles, California, is making a mechanical collection and is particularly anxious for material illustrating the history of transportation. They already have a number of good specimens from an oxcart up through the range of carriages, automobiles and aeroplanes, and they hope as soon as room becomes available to get a couple of early locomotives. Meanwhile they wish to make a collection of photographs or other historic material pertaining to railroads and locomotives.

One of the members of the Railway and Locomotive Historical Society has suggested that some of the members of the Society might like to contribute a few copies of some of their choice pictures of old engines or historic places connected with important events in railroading.

It is realized that some of the old-timers have very rare material that they are unwilling to have copied, as they like to feel that they have something unique, but this attitude often results in such material being eventually lost through fire or lack of appreciation of their heirs when

they pass on. Hence the reason for asking that copies of such pictures be preserved in such public collections as those of our Society or of the Los Angeles Museum.

If even a small portion of the membership of this Society would contribute a couple of prints each, a very comprehensive collection could soon be built up for the Museum that would be a credit to the Society. Several members have already cooperated very generously with the Museum, and their generosity has been greatly appreciated.

Any one wishing to send in pictures for preservation in this collection may address them to the Los Angeles Museum, Exposition Park, Los Angeles, California, c/o Ransom Mathews.

On Sunday, December 7th at 3:00 P. M. we will have as guests, some of the Railroad Veterans of New England. Our members are urged to come and help welcome our guests and at the same time meet our own members and view the material that we have in the rooms. All who can do so are urged to come.

THE LIVERPOOL AND MANCHESTER CELEBRATION

So much has already been written about the history of the Liverpool & Manchester R. R. and its importance to the history and development of the steam locomotive and the railway that it need not be repeated here.

It may be of interest to our readers to learn that the celebration of the opening of this road was held in Liverpool from Sept. 13-20, 1930. It was sponsored by the London, Midland & Scottish Ry. and the cities of Liverpool and Manchester.

At St. George's Hall in Liverpool was held an exhibition of historical and pictorial data relating to the Liverpool & Manchester Ry. This included such items as a photograph of the first page of the Minutes of the Directors for Tuesday, May 30, 1826; original stock certificate and other items relating to the building of the road. In addition there were 55 models of locomotives on English Railroads. In this hall was probably assembled the most complete collection of data relating to the history of the Liverpool & Manchester Ry. ever under one roof.

At Wavertree Playground there was a full size model of the famous "Rocket," "North Star," "Lion"—this was the original engine built in 1838 and was used to haul the "Train of 1830" on the Ring Railway in the playground. Here also were stationed the "Royal Scott" class of engine, the "King Stephen" and the "Lord Nelson" engines. In all there were 34 exhibits.

Each evening the "Pageant of Transport", lasting two hours was given. This included such items as the sled, sedan chair, the pack horse,

Roman chariot, Egyptian dray, and finally the survey and the opening of the Liverpool & Manchester Ry.

The authorities are to be congratulated for their efforts in staging this celebration. It is to be regretted that the elements were not so kind as many of the days it rained, but there is no doubt but that much good will come from this assemblage of so much material relating to the Liverpool & Manchester, the first railway in England.

CELEBRATION AT LOWELL, MASSACHUSETTS

On June 5, 1830, the legislature of Massachusetts granted the charter for the building of the Boston & Lowell Railroad, between those two cities, a distance of twenty-six miles. While the Granite Railway was built in 1826, this road was only three miles long and used for the transportation of granite for the building of Bunker Hill Monument. As early as 1807, Silas Whitney of Boston built a tramway of two feet gauge for the carrying of bricks, the loaded cars being forwarded to the foot of Beacon Hill while the empty cars were drawn to the top. The Boston & Lowell R. R. however, was the first road in New England to be constructed for the transportation of passengers and freight.

On June 5th of this year (1930), the Boston & Maine R. R., the present operating company, together with the City of Lowell, celebrated the one hundredth anniversary of the granting of the charter of the Boston & Lowell R. R. In the Lucy Larcom Park, near the site of the first station in Lowell, a bronze tablet was dedicated and with it was laid a twelve foot section of track made from parts of the original road—granite substructure and fish-belly rails. There was also a replica of Stephenson's "Rocket", loaned for the occasion, and one of the modern locomotives of the Boston & Maine R. R.

The present celebration was attended by the officials of the State of Massachusetts and of the Boston & Maine R. R.

Although the Boston & Lowell R. R. was the first road to be chartered in the State of Massachusetts, it was not opened for traffic until June 24, 1835 and was preceded in point of operation by both the Boston & Worcester and Boston & Providence Railroads.

On October 1, 1887, the Boston & Lowell R. R. was leased for 99 years by the Boston & Maine R. R. During that time it had built additional mileage and had acquired such roads as the Nashua & Lowell, Northern (New Hampshire), Connecticut & Passumpsic River, and Boston, Concord & Montreal Railroads. In 1919 the Boston & Lowell was consolidated with the Boston & Maine Railroad and is now a part of the Southern Division.

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Locomotive Performance of Nearly One Hundred Years Ago

By CHAS. E. FISHER

The Boston & Worcester R. R. was opened to Newton, a distance of eight miles, on April 16, 1834 and was the first railroad in operation in the State of Massachusetts. Through the foresight of one of the now retired officials of the present Boston & Albany R. R., there has been preserved and is now in my possession, the book recording the performance of the engines of the Boston & Worcester R. R., the first winter that road was in operation.

The pages indicate the name of the engine and engineer, "from and to what places", the mileage, hours on the road, the load, days lost on account of repairs and remarks. It is these remarks as set against each day and locomotive that make this book of genuine interest.

Whether any previous records were kept prior to the first entry in this book which is January 14, 1835, I doubt if we will ever know. There were three engines on the road, the "Meteor" with I. Leech for engineer, the "Yankee" with Cummings for engineer and the "Comet" with Guthrie for engineer. In the back of the book we note the "Meteor" was "put on the road" on April 2, 1834, the "Yankee" on July 3, 1834 and the "Comet" on January 21, 1835. Apparently the "Comet" had just arrived when this book was started.

The road, at the beginning of this journal, was opened as far as Westboro, a distance of 32 miles. Under favorable conditions, a round trip was made in a day, the "hours on the road" varying from four to five hours and some times longer.

The first notation we have is to the effect that the road is much "hove" by frost and is in bad running order and that they have to run slow.

- Jan. 19, 1835—"Meteor". Engine is "hawled off" to have new "excen-tricks" made and put on.
- Jan. 21, 1835—"Comet"—This is the engine recently arrived and on this day the run was made from Boston to Westboro on a passenger train in two hours. This was the first time that Engineer Guthrie had run through.
- Jan. 22, 1835—"Comet"—The return trip from Westboro was made in safety.
- Jan. 23, 1835—"Comet"—In running a passenger train from Boston to Framingham, on the return trip the cross head bolts broke and they were obliged to back in with one "engine"—we suppose the writer means cylinder.
- Jan. 31, 1835—"Comet"—On this day this engine is assigned to a freight train evidently consisting of the following:

270 rails at 200 lbs each	27 tons
9 cars at 1 1/4 tons each	11 1/4 tons
1 tender at	6 1/2 tons
Total	44 3/4 tons

- Went on levels 16 miles per hour. Reached Westboro in 3 hours 50 minutes. Steam failed several times.
- Feb. 2, 1835—"Meteor"—Went down $1\frac{1}{2}$ miles and brought "Yankee" and her passengers up. Her hose had frozen.
- Feb. 7, 1835—"Meteor"—"Snow on rails, wheels revolve, but do not go ahead."
- Feb. 5, 1835—"Yankee"—When opposite the poor house at Newton, ice on the track and in the curve, caused the engine to be derailed. Backed in after filling the boiler with water through valves account of hose being frozen.
- Feb. 4, 1835—"Comet"—Engineer Guthrie evidently got as far as the crossing with the Providence road when the hose froze. The passengers were backed in and sent on by horses. The water was warmed in the tender and at eight o'clock the engine went out. On the return trip the pumps did not work freely at Framingham. At Needham the water was low but Engineer Guthrie could not tell where the level was in the boiler and about two hundred rods below the platform the leaden plug blew out and the engine had to be hauled in. The total time on the road for this day is 20 hours, 50 min.
- Feb. 13, 1835—"Meteor"—One passenger car wheel shaft broke today. No other injury done. Five minutes detention.
- Feb. 11, 1835—"Comet"—One of the freight car wheels broke and smashed car all to pieces. Did a little damage to the freight—detained about 20 minutes.
- Feb. 14, 1835—"Yankee"—Engineer Cummins stated that at Needham it was found the pumps would not supply the boiler with water. Boiler was filled through the valves and at Framingham pumps were examined and found in good order. Dirt and a small piece of coarse bagging was found in the tender valves and after cleaned out, engine went well. The book bears the notation that strainers will be placed over all tender valves.
- Feb. 21, 1835—"Meteor"—The strap that supports the boiler was broken because of the unevenness of the road.
- Feb. 27, 1835—"Meteor"—On the eastward trip when only about 300 rods from Westboro, the broom scraper standard caught on the rail, broke the standard and derailed engine and tender down a six foot embankment and bent forward shaft of engine. Five pairs of oxen got the engine on the rails again and the down trip was made the day following.
- Feb. 27, 1835—"Comet"—Snowing, could not go fast for wheels slide on the snow. At Natick ran out of wood and water, went to Needham and took wood, backed to the Ledge and took water. Passengers were sent on by horses. About $2\frac{1}{2}$ miles from Framingham hose froze and at Framingham the hose and pipes were thawed out. About $\frac{1}{4}$ mile beyond Framingham tubes burst in the boiler and engine was hauled back to Framingham by horses.
- Feb. 23, 1835—"Yankee"—When coming around Parker's Hill, forward shaft of engine came apart in center where it had been attempted to be welded by Mr. Tufts, "but was not." Passengers brought in by horses and the "Comet" brought the "Yankee" in.
- Mar. 2, 1835—"Yankee"—The cap over the valves was removed at 11 A. M. and proper care was not used in making the joint. Engine gave out at the Providence crossing and passengers were sent on by horses.
- Mar. 14, 1835—"Comet"—Detained 45 minutes at Natick Ledge by the engine of a freight train being off the track. Detained 30 minutes more unloading a freight car and taking it off the track because the journals were broken.

- Mar. 8, 1835—"Yankee"—Snow on the rails in some places six inches deep.
- Mar. 10, 1835—"Yankee"—About two miles below Framingham the rails were covered with from two to six inches of snow. Left one freight and one passenger car at Natick. Got on with a great deal of trouble and at Parker's Hill the passenger cars were left. At Winship's crossing the engine became fast in the snow and "would not work herself out." Engineer Cummings remained with engine all night and brought engine and cars in the next morning.
- Mar. 14, 1835—"Yankee"—At Natick pond, three journals on one freight car were found broken off short. "Took the car off the tracks and then went on."
- Mar. 22, 1835—"Meteor"—"Snowing, hailing, raining and freezing." The "Meteor" and "Yankee" left Boston with 15 cars and a scraper. Went to Parker's Hill and had to leave one half of train, went on to Angers corner, backed down and hauled the hind cars up and carried this train to Charles River Bridge, pushed the front end to Needham, backed for the hind end of train and left it at Needham turnout. Got the front end of train to Framingham, left it and went to Westboro with the scraper arriving there at 8½ P. M.
- Mar. 23, 1835—"Meteor" and "Yankee"—left with two scrapers, about three inches of snow and ice on the rail. At Natick Pond the scrapers got off the track. Left one and at Charles River the flange on a wheel of this scraper broke and it went down an 8 foot embankment. Left it, got seven men to shovel snow for ¼ mile where the track was found to be clear. No injury was done to either engine or cars. "The 22nd and 23rd of March were hard days for the railroads."
- Apr. 4, 1835—"Comet"—Detained at Parkers Hill 32 minutes by the rails being covered with mud and gravel and 25 minutes at Natick Ledge for the same reason. Were obliged to run one car through at a time.
- Apr. 17, 1835—"Meteor"—On the return trip to Boston, about ½ mile below Westboro, the engine and tender were derailed. One of the "Air Spring" drawbars on "Whitmore Car" was broken and engineman went one mile before he found he had left his cars. Note: We cannot but wonder if the engine and tender were not placed on the rails before the engineman travelled one mile and found he had left half of his train.
- Apr. 16, 1835—"Yankee"—When returning with seven freight cars from Westboro, they struck a cow near "Moss Hill," Natick. Engine and tender were derailed and "shaft of tender wheels bent", but no other damage was done.
- Apr. 22, 1835—"Meteor"—The crank shaft on this engine broke at Natick. They obtained horses and put passengers and baggage into two cars and went on with only 25 minutes delay.
- Apr. 25, 1835—"Yankee"—Snowed all day. Used the snow plow from Westboro to Framingham and was three hours getting through and two hours and 33 minutes more from Framingham to Boston.
- May 7, 1835—"Col. Long"—When returning from Westboro with four cars of freight, about two miles this side of Westboro, the forward shaft broke into three pieces and detained passenger train until 6:30 in getting the engine to Westboro. "The Colonel is a total wreck". For the information of our readers, the "Colonel Long" was sent to the Boston & Worcester R. R. for trial by the builders, Long & Norris in Philadelphia.
- May 14, 1835—"Yankee"—Ashpan fell off at or near Six Mile Post.

- May 26, 1835—"Rocket"—"First time on the road, performance good." This was a new engine and made the run to Westboro with 9 cars of rails.
- June 5, 1835—"Comet"—Broke the forward shaft inside the hub at Natick. Passengers sent on by horses.
- June 18, 1835—"Comet"—Ran over two oxen at Natick and killed them. Cars were injured but not the engine. Passengers sent on by horses.
- June 22, 1835—"Rocket"—Tender shaft broke inside the wheel. "Meteor" left her freight train and took passengers to Boston.
- July 3, 1835—"Meteor"—At Newton forward shaft broke and passengers detained 3 hrs. 45 minutes. "Meteor" arrived at depot at 12:20 and had shaft repaired.
- July 3, 1835—"Yankee"—The Directors were detained at Newton 3 hrs. 45 minutes by the breaking of the "Meteor's" shaft. Near the Providence road crossing the steam pipe burst near the throttle joint.
- July 4, 1835—Against this date is the notation—"Everything went well today." The mileage of the engines indicates that the recorder of these events thought the distance from Boston to Worcester was 42 miles for there is this note—"Mr. Stuart, the distance per railroad to Worcester is 44 miles."
- July 6, 1835—"Comet"—This engine pulled the train carrying the "stockholders and Ladies" to Westboro and Worcester. The engine "Meteor" also handled a similar train.

While we have so far concerned ourselves with the "incidents" during this early pioneer period, a statement as to what these locomotives were actually doing may not be amiss. Like all roads which were built subsequent to this one, the traffic proved larger than the locomotives and cars could well take care of. The three engines which this road had when opened as far as Westboro were not assigned to any train or run, but the engine and engineer ran, first in, first out, on either freight or passenger trains, when the engine was running. It was no uncommon thing for some of these engines to make over 500 miles weekly, of six days only, and the "Comet" from May 10-16th, made 672 miles. From June 8-13th, the "Meteor" also made 672 miles; the "Rocket", a new engine, made this same period, 768 miles and the same engine from July 6-11th made 756 miles. The time given in the last case is 54 hours and 5 minutes for this period or about 9 hours daily. The locomotives made a round trip over the road daily and in many cases a trip one way was also made over the road, making a total of 132 miles daily.

- July 14, 1835—"Mercury"—This engine in charge of R. Adams, Engineer, made her first trip to Worcester and return on a freight train.
- July 22, 1835—"Rocket"—Guthrie, Engineer of the "Mercury", ran his train carelessly, so the records state, into the "Rocket's" train, injuring the foot of Samuel Kernaghan. This was the first accident in which a person received injury on the road. Before closing it may be well to state that Guthrie's name no longer appears in the records of this book.
- July 25, 1835—"Mercury"—At Westboro, Mr. Hale who had brought this engine down to Framingham, on his arrival there the "gates" were against the engine and engine and tender were derailed and had to stay there all night. "Springs were much set."
- July 30, 1835—"Comet"—"Hawled up for repairs."

- Aug. 5, 1835—"Rocket"—At Parkers Hill, five miles out, a piece of timber used for crossing rail on turnout was on the track. Engine was thrown off one spring broken, both tender shafts broken and one square passenger car "broken to pieces, but the 15 persons who were in it were not hurt."
- Aug. 7, 1835—"Jupiter"—Near the Brighton road crossing a cow was seen by the engineer 20 or 30 rods ahead of the engine. The engine was pulling a freight train and running slow and the report states the cow crossed to the left side of the track and began to feed. The engineer opened his throttle in hopes of passing the cow, but the cow turned back and the engine struck and killed her. "She was not dead when the owner came to bed her." The "Jupiter" mentioned here is a new engine and the first trip was made on Aug. 5th. There is some doubt in the mind of the author from these records whether it was the "Jupiter" or the "Mercury" that killed the cow.
- Aug. 20, 1835—"Rocket"—At Grafton the set screw of dog loosened. The engineer backed the engine to Worcester, turned the engine and then backed the engine and train towards Boston. A note on the same date states the "Mercury" was sent out to find the cause of the delay of the passenger train.
- Aug. 26, 1835—"Rocket"—At Newton the engine ran off the track and the "Comet" took the passengers to Worcester. The "Rocket" was backed to Boston and the spokes of the front driving wheels were found too loose for the engine to run until new wheels were applied.
- Sept. 7, 1835—"Yankee"—The driving dog broke when going from the engine house to the cars. "Comet" went out with the passengers.
- Sept. 18, 1835—"Comet"—At Framingham the "Gibb" in the connecting rod broke, detained 65 minutes making a new one. Three spokes broken in the forward wheels and all the others loosened. A notation follows to the effect that a pattern was made and that new cast iron wheels were in on Oct. 2nd.
- Sept. 26, 1835—"Jupiter"—About 1 1/2 miles above Westboro, the engine struck a rock, broke the box on the forward shaft, bent struts on both sides, broke two boxes on tender, one wheel on baggage car and broke one passenger car "considerable and done other damage."
- Sept. 28, 1835—"Meteor"—Crank shaft broke, came in and got horses, went to Newton with passengers and took down engine.
- Oct. 1, 1835—"Jupiter"—Crank shaft broke, passengers brought in by horses. Three spokes in the large wheels broken and all the others loose.
- Oct. 1, 1835—"Mercury"—Crank shaft broke. Evidently the writer thought further explanation was useless.
- Oct. 7, 1835—"Comet"—Engine would not steam. Five hours and 25 minutes were used on the up trip and at Worcester the netting was found choked.
- Nov. 2, 1835—"Mercury"—Valve stem in throttle rusted. Was taken out and oiled. Worked well.
- Nov. 4, 1835—"Mercury"—Thrown off the rails and ditched at Winships by road repairers leaving their cart on the track.
- Nov. 22, 1835—"Mercury"—Snowed all day. Got to Westboro at 6 P. M., put passengers into stages and sent them on to Worcester. Backed to Framingham and took passengers to Boston that had come from Worcester by stages.
- Nov. 30, 1835—"Comet"—Left three cars at Angers Corner and one at Hopkinton. Put the snow plow behind going up and left it off the track at Framingham.

- Nov. 30, 1835—"Meteor"—Broke crank shaft and engine brought in by the "Jupiter". The "Meteor" has broken two crank shafts that were made at Bridgewater.
- Dec. 1, 1835—"Mercury"—Team was on Milldam Bridge going towards the gravel bank. Engine struck the horses and killed them. Forward wheels of the engine went off the track and 12 freight cars were partly off the track. "Damage very trifling."
- Dec. 18, 1835—"Rocket"—Supply pipe burst again. Cut out a piece and found that it was stopped up when brazed in England. Note: We wonder if this can be true. While the supply pipe did burst on the 17th inst., the records show that very little trouble had been experienced prior to this date. Surely in the seven months the engine had been in service this trouble would have been encountered long before this.
- Dec. 22, 1835—"Comet"—A rail was placed on the track at the gravel bank. Engine went over it, bent crank and forward shafts and broke all of her springs.
- Dec. 24, 1835—"Rocket"—Waited 20 minutes at Framingham for freight train. Large wheels are very bad—spokes are loose.
- Jan. 5, 1836—"Comet"—Commenced snowing at 2 P. M. Had to leave passengers at Needham. Got in at 12:30 Night. Snow in places 10 inches.
- Jan. 6, 1836—"Comet"—On this day, this engine together with the "Rocket" made the trip to Needham to pick up the passengers left there the evening previous. On a later trip to Framingham the broom car wheels broke and engine was thrown off the track and forward shaft was bent. "Had to back in."
- Jan. 9, 1836—"Jupiter"—Snow on the rails. Got to Needham at 7 P. M. and could proceed no farther.
- Jan. 15, 1836—"Comet"—Baggage car struck car house door. Went off the track, stove end of "knickerbocker" and broke post that car doors hang to.
- Jan. 25, 1836—"Mercury"—Engine was sent out to clear the track, got as far as the bridge and broke end frame of engine. Hauled back to Worcester by oxen.
- Jan. 24, 1836—"Lion"—This is a new engine and the report states—"first trip, runs well, in good order. The engine went to Worcester and back."
- Jan. 25, 1836—"Lion"—On account of three feet of snow on the track at Brookline, this engine with the "Jupiter" could go no farther. The next day the rails were cleared.
- Jan. 27, 1836—"Lion"—In Worcester the gates were on the wrong track and the engine and the entire train left the rails.
- Jan. 28, 1836—"Jupiter"—At Grafton the tender bolt broke and engine hose was broken off. "When men went to shove her out she was froze and the pump broke and plunger was bent."
- Jan. 29, 1836—"Yankee"—Piston head loose, works well only does not make steam.
- Jan. 31, 1836—"Comet"—Snow on the track. Went with the "Mercury" to open the road and was nine hours getting to Worcester. Snow two feet deep on "N" plain.
- Feb. 4, 1836—"Comet"—Hose came off, got under wheel and broke supply pipe and pump.
- Feb. 8, 1836—On this day the "Lion" and "Jupiter" left with the snow plow and got as far as Natick when they became stalled in the snow. The "Yankee" was despatched and got them to Needham Depot. On the 12th these three engines tried to clear the line and got as far as Westboro. There are no entries that a single engine turned a wheel on Feb. 9th, 10th and 11th.

- Feb. 13, 1836—On this day three engines "Lion", "Yankee" and "Rocket" got as far as Westboro and the "Rocket" got through to Worcester. From the west end, the "Mercury" and "Comet" got through to Boston.
- Feb. 20, 1836—"Rocket"—Left Westboro at 12 Noon and "unhitched" five cars. Got as far as Natick pond with four and could get no farther. Left cars on siding and backed up to Framingham and then had to back to Westboro to assist the "Lion" on the passenger train.
- Feb. 25, 1836—"Rocket"—Sent to Grafton, 12 miles, to pick up the freight cars left by the "Jupiter" in consequence of a strong head wind.
- Mar. 1, 1836—"Mercury"—Ice on the rails, left 6 cars at Westboro, 9 hours going to Worcester. Note: Needless to say because of the severity of the weather, the engine mileage was not as large in winter as in summer. However, for the week ending March 5th, this engine made 612 miles. This engine made a similar mileage in January. Other engines were making from 300 to 550 miles weekly.
- Feb. 28, 1836—"Yankee"—Engine with the "Jupiter" got as far as Needham and engine, tender and freight cars left the track and were on the ice. Tender shaft was broken, one car wheel was broken and two shafts bent, "etc. etc." Note: Between Feb. 28th and Mar. 5th, four broken car wheels and two tender axles, "shafts" caused trouble on the road.
- Mar. 11, 1836—"Lion"—Axle of freight car broke in the center and 11 cars were thrown off the track and down an embankment. "Two are not worth repairing." On leaving Worcester one axle on an empty freight car broke.
- Mar. 12, 1836—"Rocket"—At Westboro pumps froze going up and at Grafton when coming down the pumps would not supply engine. The "Meteor" left her freight train and took the passenger train to Boston. Examination showed dirt and chips in the valves.
- Mar. 9, 1836—"Meteor"—Has a new crank shaft made by Sylvester & Co. "Runs well".
- Mar. 8, 1836—"Mercury"—Tire on large wheel loose. Taken off to be "resot."
- Mar. 21, 1836—"Lion"—18 cars on Needham curve. Had to leave part by going up to turnout and then return for the rest of the train. Cylinder joints are beginning to give out.
- Mar. 25, 1836—"Lion"—Joints on cylinder head (inside) "blowed" out. Arm on rocker shaft loose.
- Mar. 23, 1836—"Rocket"—This engine ahead of the "Jupiter" with a new snowplow on account of three inches of snow on the track, derailed the snowplow at the gravel bank and "Half of nose broken off." Went as well with shovels in front of broom standards.
- Apr. 5, 1836—"Lion"—At Worcester Ledge a large rock lay on the rail, fender of the engine struck the rock, rolled it out of the way, but the rock when it rebounded from striking the ledge, struck the tender with such force as to derail the tender.
- Apr. 13, 1836—"Wm. Penn"—Was put on the road this day. Had a groove cut in her under frame for bolt of slide to run in. This was done by order of Mr. D. Henshaw.
- Apr. 19, 1836—"Rocket"—At Southboro tender shaft broke. Took wheels from passenger car and put them under tender and came in. Detained 1 hr. 25 min.
- Apr. 19, 1836—"Wm. Penn"—17 cars up, runs well.
- Apr. 20, 1836—"Wm. Penn"—19 cars up, had to double on Needham curve.
- Apr. 22, 1836—"Wm. Penn"—13 cars up. Had to take water at Needham each time.

- Apr. 20, 1836—"Jupiter"—Engine was sent to Framingham to remain there "until wanted".
- May 7, 1836—"Meteor"—Thirty feet of wall in Worcester Ledge fell into the road. Passengers could not leave until 5 P. M.
- May 1, 1836—"Wm. Penn"—20 cars loaded and one empty car.
- May 3, 1836—"Yankee"—13 cars.
- May 5, 1836—"Mercury"—Engine sent to Framingham to remain until wanted.
- May 11, 1836—"Comet"—"At Parker's Hill, brought up too quick, 9 cars were thrown off track, 2 journals bent, one box and some couplings broken."
- May 17, 1836—"Meteor"—In Worcester Ledge a "dirt car" struck a passenger car and tore off the mouldings and steps. The "Jupiter" is now in service and running on the gravel train while the improvements are being made at Worcester Ledge.
- June 11, 1836—"Lowell Engine"—First time on the road, runs well. This engine afterwards appears in the records as the "Lowell."
- June 20, 1836—"Yankee"—Left Worcester at 6:18. Stopped in ledge for want of steam for 15 minutes. Arrived at 9:05, running time 2 hrs. 32 min. Valves worn out and broken.
- June 25, 1836—"Lowell"—"Rocker shaft broke, etc."
- June 21, 1836—"Wm. Penn"—Sent to Worcester to remain until wanted.
- June 22, 1836—"Jupiter"—Sent to Framingham to remain until wanted.
- July 5, 1836—"Mercury"—With engine "Lion" leading to Framingham. At Newton the gate was out of place and 2nd and 3rd cars went off the track. The end of the New York car was broken in. Detained 12 minutes.
- July 9, 1836—"Meteor"—Engine sent to Worcester until wanted. These engines that were either stored or used for "spare" should not be taken seriously as it was not long before they were in service again. Thus on the 6th inst. the "Wm. Penn" made a trip from Worcester to Boston and on the 8th and 9th inst. was on the gravel train.
- July 14, 1836—"Mercury"—Crank shaft broke, struts on center bearing broke, two stringers broke and one bent, one connecting rod bent, two center boxes broken, shaft broken short off outside of left crank and inside of right crank and bent in center. The train went 33 rods after shaft broke and wheel went off rail.
- July 12, 1836—"Lowell"—Safety valve joint blew out.
- July 13, 1836—"Lowell"—Rocker shaft and eye on dog broke. Left freight train and came to Boston.
- July 16, 1836—"Yankee"—In backing out with the passenger cars for the 11 o'clock train, wheel on the right crank shaft came loose and the "Wm. Penn" went with the train.
- Aug. 2, 1836—"Yankee"—At Hopkinton key in piston rod was gone. Put in an old rail key but that loosened at Grafton. Broke the brace between the slides and left passengers and went to Worcester with one "engine". "Lowell" went down and brought passengers up, arriving at Worcester at 8:10 P. M.
- Aug. 2, 1836—"Lowell"—On the Director's train. Was only 1 hr. and 35 min. running to Worcester.
- Aug. 24, 1836—"Yankee"—Went as far as Parker's Hill and crank shaft broke and one stringer was broken.
- Sept. 7, 1836—"Wm. Penn"—Came into the depot too fast. Could not stop until five cars had run off the track at the gate. This engine was in service between Boston and Newton on the gravel train. Note: In looking over the mileage made by these engines during the summer, the rule seemed to be that these engines made three 44 mile trips daily, when they were able, and when they were not, one of the spare engines were used. Thus, if an engine met with no trouble, it

would make 794 miles weekly (six days) during the summer, many of the engines were doing it and with the amount of gravel the road was hauling, practically all of the engines were in service.

- Sept. 12, 1836—"Lion"—Coming through Brighton at 9 P. M. the train ran into a drove of cattle killing two of them. "It was so dark, could not see."
- Sept. 11, 1836—"Wm. Penn"—Tank sent to Adam's at South Boston to be enlarged by adding 12 inches in height.
- Sept. 21, 1836—"Comet"—Switch on bridge was wrong. Engine and cars ran off the track, baggage car was slightly injured by rail of bridge running through it. Engine springs were set. "Meteor" went on with the passengers.
- Sept. 23, 1836—"Lion"—Netting "gummed" up. Detained 25 minutes washing it.
- Sept. 26, 1836—"Comet"—At 8:48 A. M. sent from engine house to freight house at Worcester. Met passenger train on curve in freight depot and was thrown off the track bending the crank shaft, supply pipe broken and strut for spring broken, "etc". Note: strange as it may seem the records do not show the name of the engine pulling the passenger train and what happened to them. Engineer Sawyer was in charge of the "Comet" but this accident did not terminate his services. So far as the records show this is the first collision that took place on the road, and perhaps the management felt that as the "Comet" got the worst of it, nothing more need be said.
- Oct. 6, 1836—"Jupiter"—At Brighton the down train was detained 1 hr and 48 min by pump joint on boiler blowing out. Passengers were pushed in by the "Meteor." "No injury to persons or property."
- Oct. 20, 1836—"Wm. Penn"—Strong head wind with rain. Had to double on all hills.
- Nov. 17, 1836—"Mercury"—In Brighton a cow on the track broke both supply pipes when the engine passed over her and four cars were derailed. "Run into the old Depot with safety!!" The location of the stock yards at Brighton caused the road much trouble with sheep and cattle being on the track.
- Dec. 6, 1836—"Yankee"—When passing under the Washington Street Bridge, the smoke pipe was broken off. Found that the height of the bridge from the rail was only 13 feet 3 inches.
- Dec. 17, 1836—"Jupiter"—At Jackson's cut, clay and gravel on the track derailed the engine, tender and one box car. Engine went down a ten foot embankment and finally stopped wheels up in the air breaking forward shaft of engine and doing considerable damage to the machinery.
- Dec. 23, 1836—"Lion"—Snow on rails. Had to leave freight train at Grafton and run to Worcester. Got the "Yankee", backed down and took up freight.
- Jan. 6, 1837—"Yankee"—Snow on rails. Left freight at Westboro and went to Worcester so as to be ready to help with the passenger trains if wanted.
- Jan. 6, 1837—"Mercury"—At Grafton, ice on the rails, engine, tender and baggage car went off the track. Got oxen and hauled them on. Thimbles in the tubes were loose and 22 were reset. The first day of the New Year was a busy one because of the snow and required much double-heading on the road.
- Jan. 22, 1837—"Yankee" and "Lion"—Sunday. Left Worcester with new snow plow and went through drifts from 3 to 6 feet deep until within 30 rods of Grafton Depot when the snow plow went off the track and ran against a stone wall. There

- was three inches of ice on the rails at this point. One side of the plow was broken off. After this they had hard going as they could only clear one rail. Went on until about a mile from Westboro where they stopped for the night, plow was broken, wood almost gone and snow four feet deep for a quarter of a mile ahead. Twelve miles were covered this day.
- Jan. 23, 1837—"Yankee" and "Lion"—Had engines hauled to Westboro, plow repaired and ready to start at 3 P. M. Almost reached Southboro and learned that very little had been done from that point to Hopkinton so returned to Westboro and arrived at 8 P. M. Ten miles cleared and run and only one scraper left on plow.
- Jan. 24, 1837—"Yankee" and "Lion"—Left at 8 A. M. and within one mile of Hopkinton found four feet of snow. Broke the crust which was six inches thick and ran through to Hopkinton. From there the road was fairly well cleared until we arrived at Framingham. From Framingham to Natick nothing had been done. We got three ox teams to go ahead and break the crust and did some shovelling until we arrived at Natick. At that point there were seventy-two men shoveling snow and right behind them were two engines and the passenger train. We let them pass us and arrived at Boston at 6 P. M. The crews made 32 miles this day and no damage done to either engine. Mr. Stuart, the signer of this report, states that had not the ice on the rails broken the plow they would have been in Boston, Monday noon.
- Jan. 22, 1837—"Lowell"—The story on the east end is much the same. On this day this engine with the "Comet" and "Mercury" and the "Baltimore snow plow" got as far as Brighton road crossing. The next day owing to bad weather they got as far as Brighton crossing and had to return. That night they got as far as the Newton poor house. On the first trip Tuesday they got as far as Needham and because they were out of water had to back in again. Started once more and at Natick found the down train waiting for them.
- Jan. 31, 1837—"Lion"—The nails under the poor house bridge have been "hove" by frost and the chimney of the engine strikes the bridge. Road is in very bad shape due to the frost.
- Feb. 28, 1837—"Comet"—Ice, snow and water on the rails. Only one engine got to Boston at 5:10 P. M.
- Feb. 27, 1837—"Mercury"—Hose worked off the tender, got under the wheels and broke the pump.
- Mar. 3, 1837—"Lowell"—Joints in steam chamber, cylinder head and valves "gone". Note: The month of February was a severe one for the railroad. The storms caused much double heading and delayed the trains but because of the similarity of these reports, they will be omitted here.
- Mar. 15, 1837—"Comet"—Snow plow ahead. Went off the track at Newton and left the plow there. 3½ hours going up because of foul water from South Cove.
- Mar. 15, 1837—"Lion"—No water at Framingham. Dirt got washed into the well for want of a curb on the top.
- Mar. 14, 1837—"Jupiter"—When passing over a gully which had been washed by rain, the crank shaft broke and engine and tender went down a fifty foot embankment. Neither engineer or fireman were injured and the cars remained on the track. The "Lowell" left her freight train and pulled the passenger cars to Boston.
- Mar. 17, 1837—"Lowell"—Ashpan came off at Hopkinton on the up trip.
- Mar. 30, 1837—"Mercury"—Strong head wind this morning and it took 3 hr., 35 min. to go up on the passenger train.

- Apr. 22, 1837—"Elephant"—A new engine. Made a round trip to Worcester on a freight train and "runs well."
- May 22, 1837—"Lion"—It is interesting to note that this engine which handled a passenger train also handles three cars of merchandise. Whether this was "mixed" service or to expedite the freight, the records do not show. It did not continue long as will be noted in a subsequent report.
- June 6, 1837—"Lion"—At Newton, a freight car axle broke and caused two freight cars, two passenger and one baggage car to be broken up and a detention of forty minutes to the passengers. Note: There are no further instances of freight cars being used on passenger trains.
- July 2, 1837—"Lion"—On this day this engine is credited with hauling a passenger and mail train. This is the first instance, in this book, where mention is made of the mail service.
- July 4, 1837—"Yankee"—"Found the bridge burned down over the Charles River and took the passenger train back to Worcester."
- July 13, 1837—"Mercury"—At Natick a freight car axle broke. Took the freight out, loaded it in another car and pulled the damaged car off the track.
It is interesting to note at this point that the "Lowell" from July 9th to 15th incl. made 880 miles, three trips of 44 miles each on every day save one and that the "Lion" for the same period less one day, made 748 miles, making three trips daily save one day.
- July 22, 1837—"Mercury"—Key in the connecting rod came out, connecting rod was bent, pin in cross head was bent and piston rod was bent. The notation states—"Was running entirely too fast."
- July 26, 1837—"Lowell"—At Grafton, tender axle broke on the up 4 P. M. passenger train. Ran the engine alone to Worcester, got another tender, backed down and hauled train in to Worcester. This is not the first instance in which the tender has either been derailed or suffered an accident and the engine has run to the nearest point for another tender. The records state that extra tenders were held for just such emergencies.
- Sept. 6, 1837—"Lion"—Apparently an express train of some sort has been added to the passenger schedule for this engine is running on a schedule of 1 hr. and 17 min. from Boston to Worcester.
- Sept. 8, 1837—"Lion"—The report states that Engineer Bullard arrived 15 minutes before his time, making the running time in 1 hr. and 2 min.
- Sept. 17, 1837—"Comet"—Water got low in the boiler and fire was put out. Continued as long as the steam lasted. Had to stop and get up steam and met up train at Hopkinton.
- Sept. 20, 1837—"Comet"—At Natick lost the nuts from the packing box on piston rod and packing blew out. "Elephant" left her freight train and took passengers to destination.
- Sept. 21, 1837—"Meteor"—"Steam high, water low, solder melted out of dome. Engine sent to machine shop for repairs."
- Oct. 3, 1837—"Rocket"—"Ran over a drunken man. Some bruises. He is getting better."
- Oct. 11, 1837—"Wm. Penn"—Engine foamed too much. Had to blow her off. The trip was made only as far as Brighton. On the next trip the "water worked much better."
- Oct. 18, 1837—"Yankee"—Here we have an instance where the guys of the derrick were too low and they took the corner off a milk car that was in the "Yankee's train."

- Oct. 20, 1837—"Mercury"—On account of foul water the engine was delayed in getting her train to Worcester. On the next day, at the first bridge above Westboro there were some dirt cars on the track and the "Mercury" and train collided with them smashing three of them, breaking the arch of the engine and the frame, and derailing the tender, baggage and "forward" passenger cars. Engineer Farwell was slightly hurt. He stated he could not see 20 rods ahead in the curve where the cars were.
- Oct 30, 1837—"Yankee"—At Charles River the engine, tender and two passenger cars went off the track because Engineer Farwell did not see that the switch was properly set. Engineer Farwell was the only one injured, his hand being so badly hurt as to make amputation necessary. There follows two notations that the gates at Charles River may be seen at 525 feet distant, the other states at 31 rods.
- Nov. 9, 1837—"Wm. Penn"—Pumps would not supply engine. Joint on cylinder head gone. Engine sent to South Cove Shop.
- Nov. 11, 1837—"Wm. Penn"—Joint on cylinder gone again. Engine sent to South Cove Shop.
- Nov. 24, 1837—"Rocket"—This engine while pulling the train carrying the Directors over the Millbury Branch, evidently just opened, collided with a train of coal cars, smashing four of them and breaking the smoke arch and steam pipe of the "Rocket". "The coal cars were sent out by Mr. Jackson contrary to orders." Which engine was attached to the coal cars or which one was despatched to the scene to pull the Directors home, the records do not show. Let us hope they were not pulled home by horses!

And here the remarks which have been so interesting and so valuable to throw light on the early days of railroading cease and we wish it could be continued further.

These engines were built as follows:

"Meteor"	Robert Stephenson	1834—first trip Apr. 2, 1834.
"Yankee"	Mill Dam Foundry	1834—first trip July 3, 1834.
"Comet"	Robert Stephenson	1834—first trip Jan. 21, 1835.
"Rocket"	Robert Stephenson	1835—first trip May 26, 1835.
"Mercury"	Robert Stephenson	1835—first trip July 20, 1835.
"Jupiter"	Robert Stephenson	1835—first trip Aug. 5, 1835.
"Lion"	Edward Bury	1836—first trip Aug. 24, 1836.
"Wm. Penn"	Baldwin	1836—first trip Apr. 13, 1836.
"Lowell"	Locks & Canals Co.	1836—first trip June 11, 1836.
"Elephant"	Baldwin	1837—first trip Apr. 22, 1837.

In the back of the volume, the "recorder" has given us the mileage of the six engines for the year 1835 (eleven months only):

"Meteor"	11 months—1835—11224 miles.
"Comet"	11 months—1835—21187 miles.
"Yankee"	11 months—1835—14194 miles.
"Rocket"	8 months—1835—11876 miles.
"Mercury"	6 months—1835—9668 miles.
"Jupiter"	5 months—1835—11372 miles.

In the report which was made the subject of our Bulletin No. 13, we find the engines built in America weighed nine tons, while those built by Stephenson weighed six tons. The "Lion" also weighed nine tons. The larger engines carry on an average 15 cars of freight between Boston and

Worcester, making a total gross load of 64.2 tons. The smaller engines carry only about five cars of freight making a total gross load of 26 tons.

"The smaller, or six ton engines, are found to be very uneconomical, being more subject to derangement, and carrying much lighter loads than the nine ton engines, with the same cost of agents, and nearly the same expense of fuel. It is stated that upon the four smaller engines, (all made by Stephenson) eleven cranked axles had broken in 2½ years' use."

The expenses in connection with the working of these engines is given fully in Bulletin No. 13 and we will not repeat here.

In giving these "remarks" as found in this early record book, I have followed the wording of the "recorder" as closely as possible. These records serve to give us an idea of what early railroading was, something that it is difficult for us in this day to appreciate. For this reason they may serve to be of interest to our members.

CORRECTIONS TO BOSTON & ALBANY R. R. LIST OF LOCOMOTIVES.

Since the publication of the list of Boston & Albany R. R. locomotives that was published in Bulletin No. 22 in which a few typographical errors occurred, a few additional corrections have been found and the following corrections and additions should be made to have a correct list.

- Page 10—Line 13—1st N Y C # 396 should read 392.
- Page 10—Line 14—The # 106 should be omitted.
- Page 10—Line 29—The "Kentucky", Hinkley, 1876 was built by the B & A 1876.
- Page 10—Line 38—The original # 11, B & A, 1876, like its predecessor carried the name "Virginia".
- Page 11—Line 25—Following this line a line has been omitted. There was a "Georgia", Orig. # 19, B & A 1874, 4-4-0, 18"x26" 60" which preceded the second # 19, new # 281 which did not carry a name.
- Page 12—Line 11—The original # 27 should be omitted.
- Page 13—Line 9—The "Champion" was renamed "Marmora."
- Page 14—Line 23—The "Switcher" was built by Norris.
- Page 15—Line 11—1st N Y C # 2535 should read 2534 and B & A 1912 number should be 906.
- Page 18—Line 4—The "Brookfield" # 109 also carried the new # 209.
- Page 18—Line 20—The "Wm. Penn" was built by Baldwin in 1836.
- Page 21—Line 37—The new # 163 was Orig. No. 11 and later 285.
- Page 21—Line 38—The "W. Bliss" # 164 was new # 264 1st N Y C # 1215.
- Page 22—Line 1—The new # 164 was Orig. No. 12 and later 286.
- Page 22—Line 9—The 2nd 168 carried the new # 168 in place of 163.
- Page 23—Line 23—The 2nd 164 was Orig. # 12, later # 286.
- Page 24—Line 17—The 2nd 213 carried new # 128 in place of 123.
- Page 25—Line 4—The 2nd 127 carried N Y C # 2520 in place of 2620.

The opening statement on Page 31 is incorrect as in addition to the "Berkshire" there were six American type passenger engines still in service. They are Nos. 208, 211, 212, 286, 288 and 290.

Also, a clipping has been noted which states that the old "Brookline" was renamed "Z. E. Coffin". The old "Brookline" appears in the list of 1865 and in the list of 1866 the "Brookline" is omitted but the "Coffin" appears. From what can be learned the "Brookline" was rebuilt by Hinkley to a 4-2-0 type and the engine renamed "Z. E. Coffin". The engine was found to be too light for the service required and it was sold to the Penobscot & Kennebec R. R. where it was renamed "Farmingdale". There is no connection between the "Z. E. Coffin" and the "Victor" as shown in the B & A list on Page 20.

While the authors regret that these inaccuracies appeared in the original list as published in Bulletin No. 22, the arrangement and compiling of this list was no small job. The above corrections should be added to the original list that appeared in Bulletin No. 22.

The Canterbury and Whitstable Railway

By REV. REGINALD B. FELLOWS

IN Mr. D. S. Barrie's interesting article on the centenary of the Liverpool and Manchester Railway published in Bulletin No. 22, he refers to the Canterbury and Whitstable line which celebrated its centenary some four months earlier than the northern line, and states that its only claim to recognition by the railway historian is the peculiar insistence of its promoters upon the inclusion in the system of a tunnel as a desirable novelty though both useless and expensive.

It is quite true that in most of the accounts of the Canterbury and Whitstable railway that have been published during the last twenty-five years currency is given to the story that a line of country was especially chosen for the railway where a tunnel could be made, it being thought that passengers would be attracted to the railway by the novelty of a tunnel. The story is given in C. E. R. Sherrington's "Economics of Rail Transport in Great Britain" (1928) Vol. 1, p. 12, and in W. J. Gordon's "Our Home Railways" (1910), Vol. 1, p. 183 (to mention only two writers of repute). So common is the story that it is actually embodied in the "Big Book of Railways", a charming book for very small children published by the Oxford University Press, and in the guise of a nursery story it is, I think, at its best. None of the writers give any reference to earlier or authoritative documents. Although I have searched the files of more than one Canterbury newspaper published contemporaneously with the construction of the railway, I have been unable to find any reference to this curious story about the origin of the tunnel, but it is perfectly certain from the early records that the promoters of the railway were anxious to have the most direct line possible between Canterbury and Whitstable, and in consequence rejected William James' earlier proposal for a circuitous line of greater length but with easier gradients. The route actually chosen on William James' final survey was about as direct as possible, as short as the turnpike road with which the railway was to compete for the carriage of coal, merchandise and passengers from Whitstable Harbour, but to secure this direct line either a cutting or a tunnel north of Canterbury was necessary. The construction of a cutting generally involves the purchase of a large area of land, and, at Tyler Hill, a bridge would have been necessary as well to carry the existing highway over the cutting near Brotherhood Farm. That a tunnel should have been made in preference to a cutting is not in the circumstances remarkable—it cost however a great deal more than was expected.

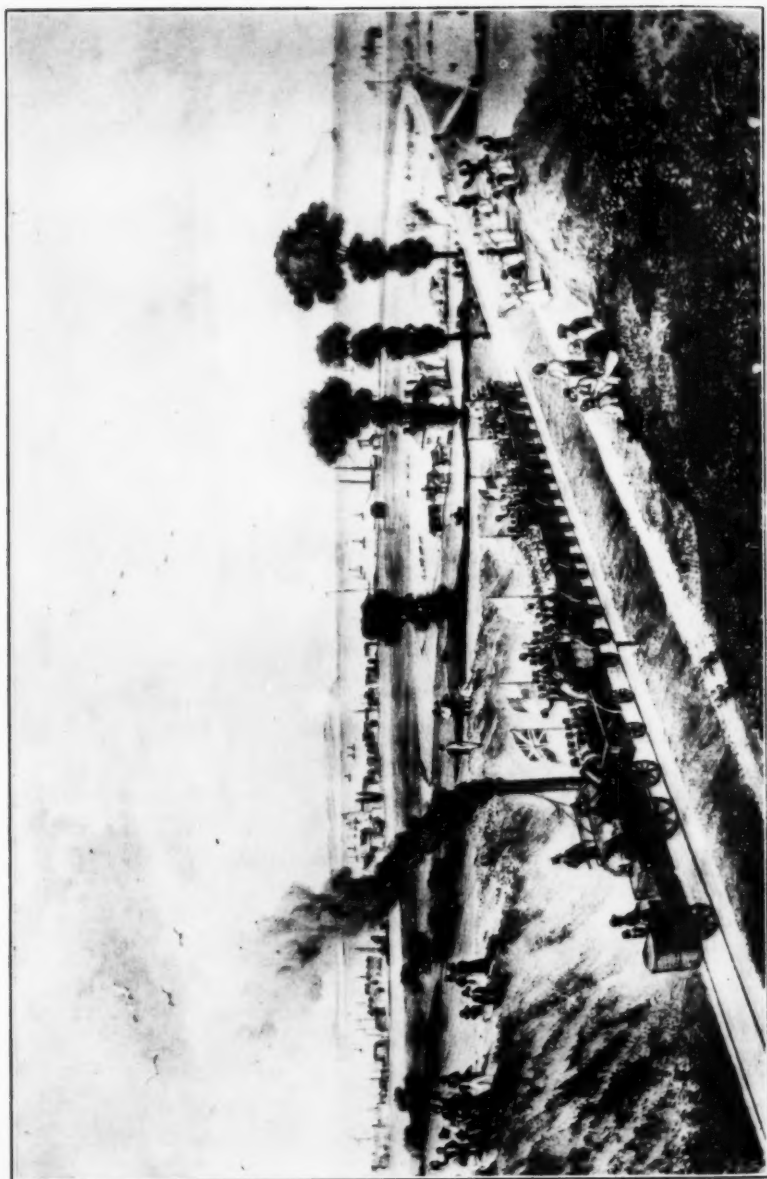
The tunnel was adversely criticised by the Editor in *The Railway Magazine and Annals of Science*, April 1836, as being dangerous from

the point of view of health, and so liable to make those who travelled through it catch cold that passengers were deterred from using the railway, but he makes no reference to the story that the tunnel was intended to attract passengers to the railway. Nor is there anything in a special article on the Canterbury and Whitstable Railway in *The Railway Magazine* of October 1835, which was illustrated by an engraving of the tunnel, to suggest that it was constructed for any other purpose than that of providing the most direct line between Canterbury and Whitstable. The engraving, which is reproduced here, is interesting as showing the sheaves and the rope with an open passenger coach being hauled up the Tyler Hill incline from Canterbury. This section of the line was worked by a stationary engine from 1830 to 1846. Since that date locomotives have worked through the tunnel. It was on this incline that I. K. Brunel spent some days making experimental runs in 1835 in order to convince the House of Lords' Committee on the Great Western Railway Bill that his own proposal for a line through the Box tunnel, where the incline is less than at Canterbury, was not the impracticable and dangerous scheme which it had been stated to be by his opponents.

Although the Canterbury and Whitstable Railway was not, until it was leased to and finally purchased by the South Eastern Railway, a financial success, it is of interest as being the first passenger railway in the south of England and also the first railway in any part of England to convey ordinary passengers in steam hauled trains. Many distinguished names, too, were associated with this railway. George Stephenson, Joseph Locke, John Dixon and Robert Stephenson all helped in its construction, while the plan and section of the line for which the Company's first Act was obtained in 1825 were set out by William James, whose claim to be the "Father of Railways" has been admitted by many who were well qualified to form an opinion.

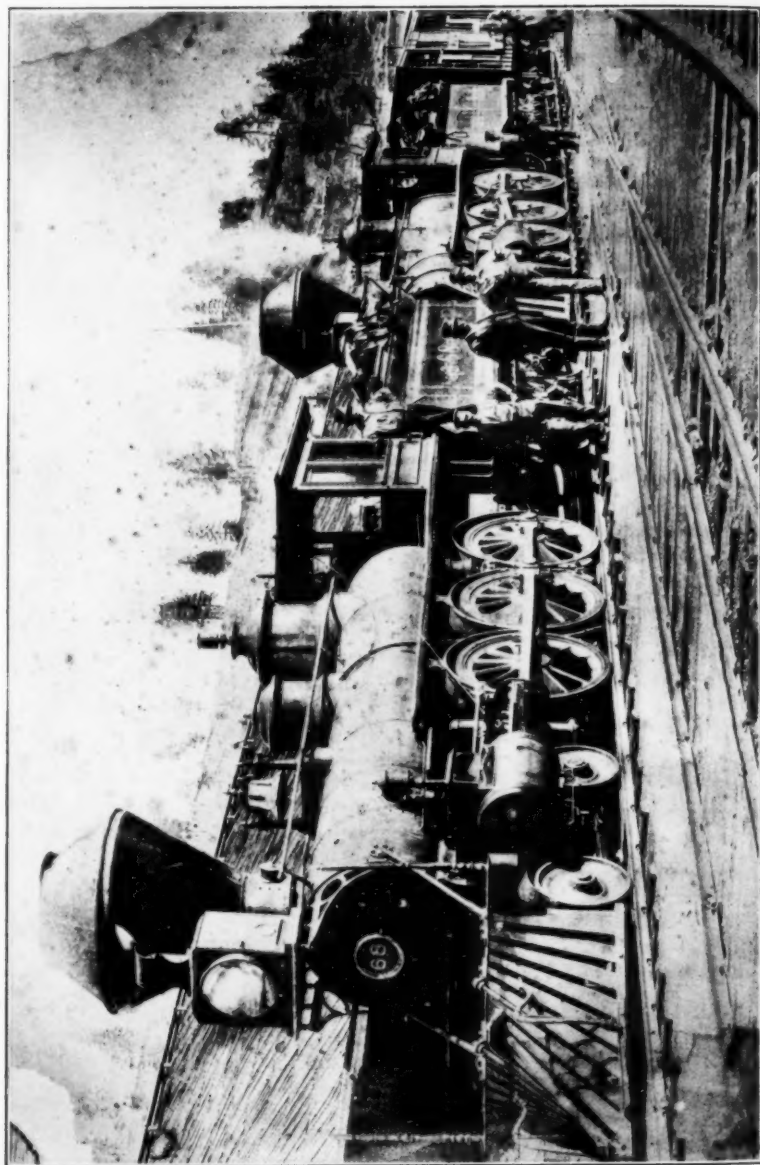


THE CANTERBURY AND WHITSTABLE RAILWAY, FROM THE ENTRANCE
OF THE TUNNEL NEAR CANTERBURY.



CANTERBURY & WHITSTABLE RY.

View of the Canterbury-Whitstable Railway from Church St., Whitstable, taken on the opening day, May 3rd, 1850.



A VETERAN LOCOMOTIVE STILL ON THE JOB.

Central Pacific 2768. — "Photomicrograph" — May 1914. — 1914.

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A Veteran Locomotive Still on the Job

By D. L. JOSLYN

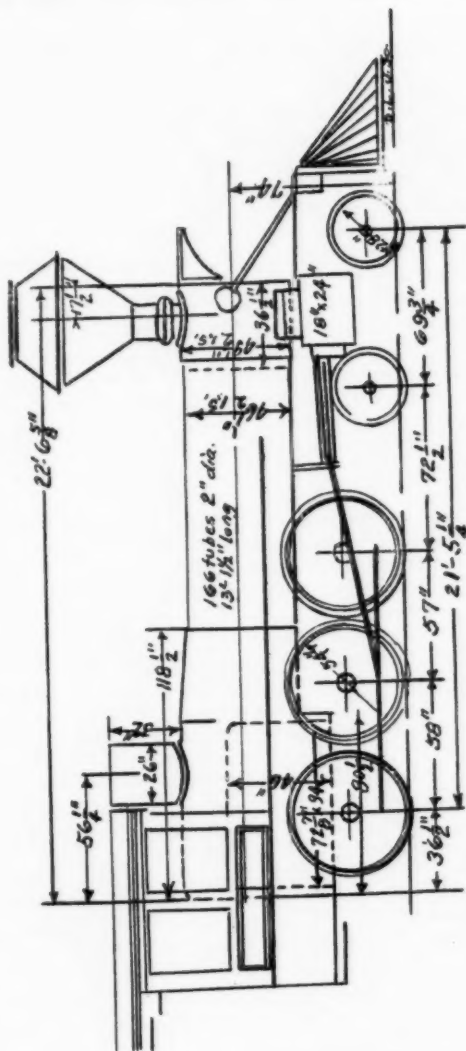
IN 1868 the Central Pacific R. R. of California, received from the builders, (McKay and Aldus) at East Boston, locomotive No. 68 named "Peoquop", named for the Peoquop tribe of Indians. This locomotive arrived via Cape Horn and was brought to Sacramento on a river schooner and was placed in service on April 2nd 1868. It put in good work hauling supplies to Summit when the road was building and later was used in freight and passenger service across the Sierra Nevada mountains.

The locomotive with others of its class was in all branches of the service until 1891 when it was out of service for a time and was finally brought in the shop and rebuilt. The rebuilding consisted of the following; a new and larger boiler, new drivers 3" larger in diameter, changing position of the drivers, shortening the wheel base from 21' 5 1/4" to 21' 2 1/4", new cylinders of the same size but bringing them down on a straight line in place of being on an angle, changing the cross head guides from 4 bar type to Laird type, applying new pistons and rods, new cross heads, applied air brakes of the push down type on the last two drivers, in other words the engine was brought right up to date for the period. After rebuilding it was given the same number as before, No. 68, but a short time later in 1891 the number was changed to 1536 and she had that number until 1901 when the number was changed to 2001, which number it still has.

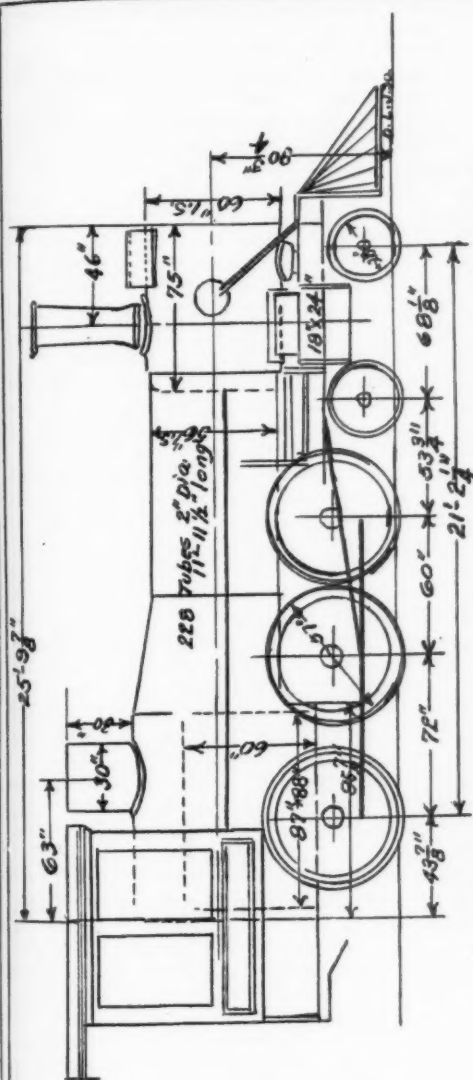
After rebuilding the engine was used for a number of years in freight service across the mountains running out of Rocklin to Wadsworth. Later it was used down the valley when the Co. got larger engines for the mountain service. I remember seeing the little old engine come across the Sacramento river bridge with a string of freight cars on several occasions. In later years the engine was sent to the Portland division and it worked on the Tilamook branch where our friend Herbert L. Arey used it for a while. It is now doing switching service at Dalles, Oregon but as the boiler is now old and is not worth renewing the little old engine is marked up to be dismantled.

At various times there have been added to the engine parts such as modern air brake equipment, electric head light, cast steel bumper beam, automatic coupler, metal pilot, steel cab, and other modern parts. As the engine now stands about all that still remains of the original locomotive is a part of the old frames. But even at that she is quite a veteran as there has not been a new boiler added since 1891 and that is quite a record. The boiler has been kept up to date by adding parts etc., and by repairs when needed.

One photograph shows the engine as it was in 1876 when it was hauling the overland train in company with No. 198. This picture was taken at Colfax, Calif. The man in the cab gang way was recently pen-



C. F. 68, Built by McKay & Aldus 1868
 Cylinders 18" Dia. x 24" Stroke, Drivers 54" Dia.
 Weight of engine loaded 73,800 lbs.
 " an truck 18,500 lbs.
 " Drivers 53,300 lbs.
 Grate Area 51.21 Sq. feet.
 Heating surface of fire box 85.1 Sq. feet.
 " Tubes 1089.4 " "
 " Total 1194.5 " "
 Boiler pressure 130 lbs. per Sq. inch
 Tractive effort, 85% M.E.P. 15840 lbs.



C.P. 68 rebuilt Sacramento Shops 1891, number changed to 1536, 1891 and changed to 2001 in 1901.

Cylinders, 18" Dia. x 24" Stroke, Drivers 57" Dia.

Weight of engine loaded 113950 lbs.

" on truck 18750 "

" Drivers 95200 "

Grate area 25.38 sq. feet.

Heating surface, Fire Box 129.4 "

Tubes 1417.6 "

Total 1547 "

Boiler Pressure 160 per sq. inch

Tractive effort (85% M.E.P.) 18550 lbs.

sioned as Engineer. At the time the picture was taken he was fireman on the No. 68. The other picture was taken several years ago up in Oregon and shows the engine as it is today.

I have made two small diagrams of the engine as it appeared before rebuilding and as it appeared right after rebuilding. In these diagrams you can get a good idea of the engine before and after.

In the later picture of the old engine you will note that it looks quite modern. That is because the S. P. Co. makes it a point to keep all of their power modern as possible.

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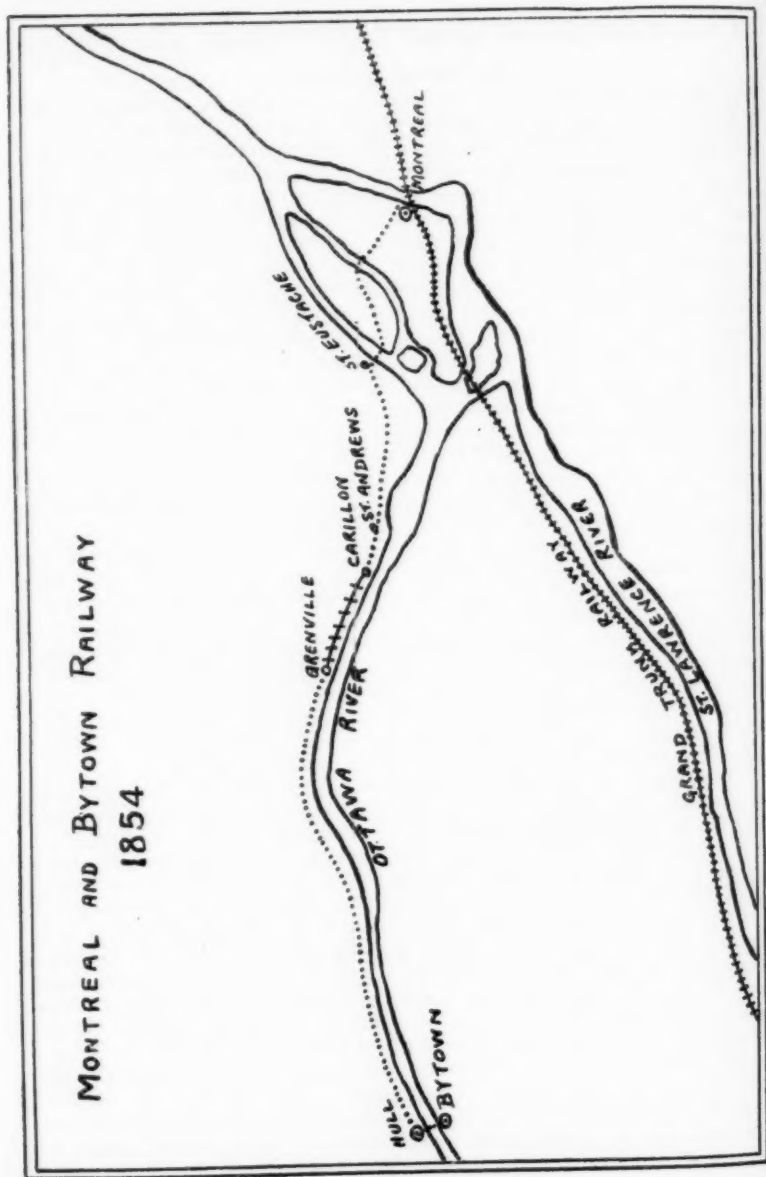
The Carillon and Grenville Railway

By ROBERT R. BROWN

BEFORE the advent of automobiles one of the favorite excursions for tourists and for the people of Montreal was a trip up the Ottawa River by boat. Midway between Montreal and Ottawa there is a series of rapids extending about 12 miles and as the canal there is very small and only suitable for small freight boats the large passenger steamers were unable to pass through. Boats were run from Montreal to Carillon, at the foot of the rapids, and from Grenville, at the head of the rapids, to Ottawa, and to carry the passengers past the rapids a curious old railway was used. The ride on the train was one of the principal attractions of the trip as the rolling stock, always a source of interest to travellers, was built during the fifties and probably was the last broad gauge train to run in America. While, in its later days, the Carillon and Grenville Railway was little more than a curiosity; originally it was intended to form part of an extensive group of railways, sometimes referred to in the newspapers at that time as the Great Montreal and Ottawa Valley Trunk Line.

A charter was obtained as early as 1848 but it was not until about the time the Grand Trunk Railway was organized in 1852 that any action was taken. A group of prominent Montrealers organized a number of companies to build a railway up the Ottawa Valley that would open up a new country and form a valuable feeder for the Grand Trunk. The Montreal and Bytown Railway was to extend from Montreal to Bytown, as the city of Ottawa was called until 1851, a distance of 119 miles and was to include two cheaply constructed branch lines, built with wood and strap iron rails, to Lachute and to St. Jerome. The Bytown and Pembroke Railway was to extend westward to Annprior, a distance of 35 miles, and eventually to Pembroke, about fifty miles more. The Brockville and Ottawa Railway was to extend southward from Bytown and connect with the Grand Trunk Railway at Brockville.

Contracts for the construction of the three railways were given to an English firm, Sikes, de Bergue and Co., and were under the personal supervision of Alexander Sikes. By the contract for the Montreal and Bytown Railway, the contractors were to receive for 110 miles of main line and 23 miles of branch tramway, the sum of £770,000 or about \$3,850,000; and in the event of the work exceeding $2\frac{1}{2}\%$ of the estimated lengths, then the contractors were to receive £6,500 (\$32,500) per mile of excess on the main line, and £1,200 (\$6,000) per mile for the extra length of tramway. Work was immediately commenced on the Montreal and Bytown Railway, the first and most important unit; surveys were made, a saw mill was erected at St. Andrews to supply lumber for the railway, and as the canal between Carillon and Grenville had been neglected and had become almost useless it was decided to rush the construction of the line between those points. The railway was to start from the Montreal Harbour near the foot of Jacques Cartier Square, then by a tunnel under Notre Dame Street to Craig Street, thence on the east of St. Denis Street to the height of land at Cote a Barron, and



northerly to Riviere des Prairies, near Ahuntsic, then turning westward in the direction of St. Martin and St. Eustache. From the latter town the line was to pass through Belle Riviere and St. Andrews, touching the Ottawa River at Carillon, and following its north shore through Grenville, in a very direct line to the village of Hull, opposite Bytown. The first part of the line was to open up a rich farming country and also afford ample supplies of fire wood then so inordinately expensive in the city; the portion of the line beyond Grenville was to serve a lumbering country and it was hoped the railway would give Montreal a share of the export of deals to Europe, which was then monopolized by Quebec.

Mr. Sikes sent out his two brothers, William and Samuel, both skillful mechanics, and they set to work on the 13 miles between Carillon and Grenville; the part between Montreal and Carillon was let to sub-contractors and work was started at several points. The old Provincial Standard Gauge, 5' 6", was adopted, and the rails were U shaped iron bridge rails similar to those used on the Grand Trunk and Great Western Railways. Later on a few short sections were relaid with light modern steel rails.

The Carillon and Grenville section of the Montreal and Bytown Railway was soon completed; two locomotives and some cars were purchased and service was inaugurated October 25th 1854; the trains being run in connection with the steamers of the Ottawa Navigation Co.

The following year Alexander Sikes sailed for America for the purpose of inspecting the work but the ship, with all on board, was lost at sea and when the news became known in England the remaining partners decided to abandon the contracts. The Canadian directors of the railway company and the two Sikes brothers tried to raise the necessary capital in Canada but without much success and as the commercial depression following the Crimean War was just beginning the Company soon became bankrupt and the project came to an untimely end.

The 13 miles has cost \$98,761, or about \$7,745 per mile and on January 5th, 1858 Sir John Abbott, solicitor for the old Company, and a few associates bought the railway for £5,300 (\$25,758) and operated the line for about five years.

About that time Ottawa was made the capital of Canada and as a consequence traffic on the Ottawa River increased enormously. The only railway running there was the Prescott and Bytown, noted principally for discomfort and poor service while the Ottawa Navigation Co. had put on new steamers that were famous for their speed, size and comfort. Traffic continued to increase and in 1863 the Navigation Co. found it necessary to purchase the railway; the name was then changed to Carillon and Grenville Railway and for many years it formed an interesting and important link in this chain of transportation.

About 1909 a new company was formed, the Central Railway of Canada, to carry out the original project of building a direct line from Montreal to Ottawa and the Ottawa Navigation Co., and the Carillon and Grenville Railway were taken over with that object but the following year the new company got into difficulties and the train service was

suspended. The line lay idle for four years, until the spring of 1914, when it was acquired by the Canadian Northern Railway to form part of their new transcontinental line. After a delay of several years a number of missing links were completed, the old railway was rebuilt to standard gauge and trains began running again in 1919. When the Canadian Northern bought the old line efforts were made to have the two 60 year old locomotives put in a museum but the railway did not realize the historical value of the two engines and they were sold to a junk dealer.

In 1854, when the railway was first opened two locomotives were bought; No. 1, called the "Carillon", was of uncertain origin as no contemporary record of it has been found. It was a 4-4-0 engine, about 28 tons, had outside horizontal cylinders, and an iron railing along each side and across the front. It resembled the Portlands of that period and there is reason to believe it was Portland locomotive No. 63 listed as having been built "for a Canadian road" about May 1854. It was broken up in 1895. No. 2, the "Grenville", was built by Kinmond Brothers of Montreal in September 1854; it was a small inside connected 4-4-0 engine similar to the Portlands, then the favorite make in Canada, except that it had an English type plate frame. About 1870, when traffic was very heavy, a third locomotive, the "Ottawa", was purchased from the Grand Trunk Railway. It was one of the fifty locomotives built by Peto, Brassey, Betts and Jackson at their Canada Works, Birkenhead, England, and shipped to Canada between 1854 and 1858. (Foot note:—See Mr. Loye's article on the Birkenheads in Bulletin 18) Its exact age is unknown, but the long wheel base of the leading truck and the comparatively attractive appearance would indicate that it was one of the later ones and probably was built about 1857 or 1858. The "Grenville" and the "Ottawa" remained in continuous service until 1910 and it is likely the "Grenville" holds the Canadian record for long service.

The following is a list of the locomotive stock of the Carillon and Grenville Railway, though in some cases the dates and dimensions are only approximately correct:

1854 No. 1 Carillon	4-4-0	60"	15x22	28 tons	Portland
1854 No. 2 Grenville	4-4-0	60"	14x21	22 tons	Kinmond
1870 No. 3 Ottawa	4-4-0	60"	16x20	25 tons	Birkenhead

Traffic began to lessen about 1890 and the locomotive "Carillon" was scrapped in 1895. The "Ottawa" was acquired about 1870 but was then about twelve years old.

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Also considerable information was supplied by Dr. Albert E. Halsey, of Carillon, son of the late John Halsey, for many years the Superintendent, Master Mechanic and Engineer of the Carillon and Grenville Railway.

The Nova Scotia Railway 1854-1872

By ROBERT R. BROWN

DURING the first half of the nineteenth century Canada consisted only of parts of the present provinces of Ontario and Quebec while the three Maritime provinces, Nova Scotia, New Brunswick and Prince Edward Islands, were quite separate. During the winter months, when the St. Lawrence River was frozen over, the province of Canada was cut off almost entirely from the outside world and trade was practically suspended. Travelling within the province was comparatively simple but as far as the rest of the world was concerned travellers could make their way to New York by way of Lake Champlain only with the greatest difficulty and, for about five months, freight traffic ceased entirely except for occasional loads of fish brought in from the New England seaboard in large sleighs.

As early as 1832 it had been suggested that a railway from Quebec to the Bay of Fundy would relieve the upper province and also aid the development of the Maritime provinces and eventually lead to the union of all the separate provinces then known under the general name of British North America. In 1836 the St. Andrews and Quebec Railroad Company was incorporated, and the Imperial Government contributed £10,000 toward the cost of the survey which was made by Captain Yule of the Royal Engineers. The line was to run from St. Andrews, on the Bay of Fundy, north to Woodstock then westward through what is now northern Maine, but then considered Canadian territory, to Quebec. It was estimated the distance would be about 300 miles and the cost about One Million Pounds.

In 1842, before actual construction could be started, the Maine boundary dispute was settled, disastrously for Canada and the railway had to be postponed indefinitely.

In 1845, the year of the great railway mania in England, the project of an inter-colonial railway was revived but this time the line was to extend from Quebec to Halifax. During the next few years a dozen or more routes were surveyed and negotiations were carried on between the Imperial and the three Provincial governments but the disputes over the route were so heated that it soon became apparent that the possibility of joint action was remote so the three provinces, without any unity of plan, commenced the construction of their own sections of the line.

The Nova Scotia Railway was authorized by an Act of the Provincial Legislature on March 31st 1854 and the money was to be raised through the sale of provincial debentures in London by the English banking firm, Baring Brothers, who also helped finance the Grand Trunk Railway. On June 13th 1854, with the usual ceremonies, the first sod was turned at Richmond, in the north end of the city of Halifax, and construction of the first ten miles of the line was started. By the end of the year the line was completed to Four Mile House and cars were running to that point.

A locomotive, the "Mayflower", was built at East Bridgewater, Mass., by or under the direction of Elias Woodsworth, a native of Annapolis, N. S. When the locomotive was completed and shipped to Halifax in the fall of 1854 Woodsworth accompanied it and was given the position of Master Mechanic but unfortunately in December 1855 the "Mayflower" ran off the track, broke through the ice of Bedford Basin and Woodsworth was drowned. In addition to the "Mayflower", two small 4-2-0 ballast engines were ordered from Neilson & Co., of Glasgow, and they arrived at Halifax in the spring of 1855; they were named the "Sir Gaspard" and the "Joseph Howe" and the following year they were provided with cowcatchers and cabs.

Construction was pushed as rapidly as the slender resources of the province would permit and by the summer of 1857 the line was completed to Truro Road, now Lantz, 31 miles from Halifax and as several new locomotives had been received from Scotland regular service was inaugurated. According to the first time table trains left Halifax for Truro Road at 7:30 A. M. and 1:15 P. M. arrived there at 9:40 and 3:25 and left Truro Road at 10:15 A. M. and 4:15 P. M. and arrived at Halifax at 12:15 and 6:15 indicating a running time of 15 miles per hour.

When completed the line was to be in the shape of a large Y, the Main Line extending from Halifax to Truro, 62 miles, and a branch from Windsor Jet., to Windsor, 32 miles. Several large bridges delayed the completion of the line and it was not until the fall of 1858 that the railway was completed. Regular service to Truro was inaugurated on December 15th and about 500 people made the trip on the first train. It was feared that the village of Truro would not be able to feed so many in the two hours between arrival and departure but the ladies of the Methodist Church served dinner in the "meeting house" and all were satisfied.

As it was expected that the Nova Scotia Railway would connect eventually with the European and North American Railway in New Brunswick and with the Grand Trunk Railway in Canada the gauge adopted was the old Provincial Standard, 5' 6", also adopted by the other two lines. The cross ties were split half logs, 10 feet long, 10 inches wide and 5 inches thick, and spaced 2½ feet centres. The rails were double headed, 63 lbs. to the yard, supported in cast iron chairs spiked to the ties and the rails secured in the chairs by wooden keys. This type of superstructure was found to be rather unsatisfactory; the wooden keys were continually loosening and a great many of the cast iron chairs broke, especially in winter. Later on, rail of the present type were adopted but instead of using fish plates they were secured at the joints by steel scabbards; said to have been a very superior type of fastening though occasionally the scabbards slipped along the rail and allowed the joints to separate.

An extension from Truro to Pictou Landing, 50 miles, was opened for traffic on May 31st, 1867 and as this branch passed through the Pictou County coal fields coal was tried as fuel and was found to be much cheaper than wood so the locomotives were converted to coal burners.

The Nova Scotia Railway continued as a provincial venture until Confederation, July 1st, 1867, when it was transferred to the new Federal Government to form part of the proposed Intercolonial Railway; it continued running under its old name until November 1st, 1872 when the "missing link" between Truro and Painsie Jet., was completed and through trains were run from Halifax to Moncton and Saint John. In 1875, when the Northern Division of the Intercolonial was completed, the old acquired lines were altered from the old Provincial Standard Gauge, 5' 6", to the new Standard Gauge, 4' 8½".

The time table of 1866 gives some interesting details of the line under provincial management.

The Nova Scotia Railway at present connects Truro and Windsor and Halifax, N. S.

Avard Longley

T. Foot

S. Fleming

C. Schrieber

W. H. Tremaine

George Taylor

W. Johnson

W. Marshall

Chief Commissioner

Secretary

Chief Engineer

Divisional Engineer

Divisional Engineer

Traffic Superintendent

Locomotive Superintendent

Road Inspector

Summer Arrangements

Trains leave Halifax for Truro at 6.00 A. M. and 3.30 P. M.

Trains leave Halifax for Windsor at 6.45 A. M. and 4.15 P. M.

Trains leave Truro for Halifax at 6.20 A. M. and 4.00 P. M.

Trains leave Windsor for Halifax at 6.45 A. M. and 4.50 P. M.

The morning train from Halifax connects at Truro with the stage coaches for Londonderry, Amherst, Sackville, Dorchester and Moncton and thence by rail for Shediac and Saint John and with the stage coaches of Hiram Hyde for Pictou and Point Brule and steamer thence to Prince Edward Island, Shediac, Miramichi, Bay Chaleur and Quebec and with Lindsay's line of stage coaches from New Glasgow to the gold fields and Canso, as well as Sydney and Arichat, and all points in Cape Breton. At Pictou, stages for River John, Wallace, Pugwash and Amherst connect daily. At Windsor the steamer Empress connects on Wednesdays and Saturdays for Saint John, N. B., and thence by railway to Shediac, or by the international steamer to Portland and Boston, and river steamers to Fredericton, Woodstock and Upper St. John. The stage of King Bros., also here connect to Annapolis, Digby, Yarmouth and all places in the Acadian Valley.

Passenger fares—First class, three cents a mile, second class, two cents a mile. Return tickets a fare and a half. Season tickets for three and six months at a reduced rate. Summer arrangements commence May 14th.

N. B.—The city horse cars connect with all trains at Richmond.

Fares were fairly low and so were the wages judging by present standards; engineers and conductors were paid ten shillings (\$2.40) per day while firemen, brakemen and baggage men had to be content with five shillings though, no doubt, they considered themselves fairly well paid for those days.

The following is a list of the locomotive stock of the Nova Scotia

Railway:

1854 #	1	Mayflower	15x20	60"	4-4-0	22 tons	Woodsworth
1855 #	2	Sir Gaspard	12x18	60"	4-2-0	17 tons	Neilson
1855 #	3	Joseph Howe	12x18	60"	4-2-0	17 tons	Neilson
1856 #	4		10x18	42"	0-4-0	10 tons	Neilson
1856 #	5		10x18	42"	0-4-0	10 tons	Neilson
1856 #	6		16x21	60"	4-4-0	28 tons	Neilson
1856 #	7		16x21	60"	4-4-0	28 tons	Neilson
1858 #	8		14x22	60"	4-4-0	22 tons	Portland
1858 #	9		16x22	60"	4-4-0	28 tons	Portland
1858 #	10		16x21	60"	4-4-0	28 tons	Neilson
1858 #	11		16x21	60"	4-4-0	28 tons	Neilson
1858 #	12		16x22	60"	4-4-0	28 tons	Portland
1859 #	13		14x22	60"	4-4-0	22 tons	Portland
1859 #	14		16x22	60"	4-4-0	28 tons	Portland
1858 #	15		16x21	60"	4-4-0	28 tons	Neilson
1858 #	16		16x21	60"	4-4-0	28 tons	Neilson
1859 #	17		16x21	60"	4-4-0	28 tons	Neilson
1859 #	18		16x21	60"	4-4-0	28 tons	Neilson
1859 #	19		16x21	60"	4-4-0	28 tons	Neilson
1859 #	20		16x21	60"	4-4-0	28 tons	Neilson
1866 #	21	(Lost at sea)			4-4-0		Kingston
1866 #	22				4-4-0		Kingston
1866 #	23				4-4-0		Kingston
1869 #	24				4-4-0		Kingston
1870 #	25				4-4-0		Kingston

Numbers 2, 3, 4 and 5 were small ballasting locomotives and were never used for any other purpose; in 1869 the "Sir Gaspard" and the "Joseph Howe" were sold to the Windsor and Annapolis Railway then under construction. Details of the Kingston locomotives are lacking; they were built by the Canadian Engine Co., Kingston, Ontario; they were sent down to Portland over the Grand Trunk Railway and shipped from there to Halifax by boat. Number 21 was lost when the S. S. Equator sank in December 1866 shortly after leaving Portland.

The records of the Portland Co., show that six locomotives were built for the Nova Scotia Railway but the records of the railway show only five and there is nothing in the annual reports to explain this discrepancy.

About 1872 or 1873, after the line had become part of the Intercolonial Railway, a few locomotives were built in Halifax by a man named Montgomery but little is known about them and old engineers say that they were not very successful and did not last long.

When the gauge was altered in 1875 most of the old broad gauge locomotives were rebuilt and remained in service for many years. Three of the Kingstons, when rebuilt, were given to the Windsor and Annapolis Railway, now the Dominion Atlantic Railway, in exchange for some of their old broad gauge engines.

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Outline of the History of the Grand Trunk Railway of Canada

By WILLIAM H. BREITHAAPT, C. E.



WHILE much has been written on various features of Grand Trunk Railway history, a connected, continuous account of this, the largest and most comprehensive transportation system in Canada up to the time of the development of that part of the country west of the Great Lakes, has not yet been given. The object of this paper is to present a general history of beginnings and development, both of which were complicated and involved, and to give some particulars of the engineering features.

For better understanding a brief reference to geography and to political history is in order. Canada, now practically the whole of British North America except Newfoundland, comprised, up to 1867, only the territory from Lake Superior to the Gulf of St. Lawrence, known first as Upper and Lower Canada. In 1841 Upper and Lower Canada were united into one province. In 1867 the federal union, the Dominion of Canada, was formed. At first it consisted of four provinces, Nova Scotia, New Brunswick, Quebec and Ontario, the two latter being the original Lower and Upper Canada respectively. In 1870 the mid-continent province of Manitoba; in 1871 the Pacific coast province of British Columbia; in 1873 the third maritime province of Prince Edward Island, and finally, in 1905, Saskatchewan and Alberta, on the great plains and partly including the Rocky Mountains, became provinces of the Dominion.

The first main transportation routes in Canada were waterways; the rivers and Great Lakes, from the far interior of the country to the seaports. Roads were at first portage routes between parts of the waterways. In like manner the first railway was a portage route between waterways. This was the Champlain and St. Lawrence Railway, later called the Montreal and Champlain Railway, from St. Lambert on the south bank of the St. Lawrence river, near Montreal, to Rouse's Point on Lake Champlain, opened in 1836. The track was of wooden longitudinal timbers on which were spiked flat bars of iron, and horses constituted the original motive power. The first steam locomotive came from England in 1837.

The Champlain and St. Lawrence Railway was at best a summer portage road; it was well over a decade after its advent that railroading proper began in Canada. In the neighboring United States the first section, 14 miles, of the Baltimore and Ohio Railway was open for traffic in 1830; the South Carolina Canal and Rail Road Company had 62 miles of railway open in 1832, in which year the Camden and Amboy, now part of the Pennsylvania Railway, was also opened for traffic; the Mohawk and Hudson and the Harlem Railway, later parts of the New York

Central and Hudson River R. R., date from 1830 and 1831; and the period 1831 to 1837 covers the beginning of various other railways in seaboard states. 1837 was a year of serious business crisis, after which railway building was materially checked in the United States for about ten years.

The initiative in Canada may be said to have come in what are still known as the Eastern Townships of Quebec on the New Hampshire and Vermont border, where an enterprising land agent and colonizer, A. T. Galt, later Sir Alexander Galt, was the moving spirit. Galt advocated a line from Montreal to the seaboard, with Boston first in view as the eastern terminus, but later displaced by Portland. Montreal, at the base of a great water transportation route, by rivers, canals and lakes, to the far interior, was indifferent until, in 1845, a bonding bill, permitting free passage through the United States of goods destined for Canada, was passed in Washington. This opened a route from New York and other United States ports direct to western Canada, and Montreal saw the need of connecting with the nearest winter seaport.

In 1845 the Canadian legislature incorporated Galt and his associates as the St. Lawrence and Atlantic Railway Company, with route for the railway from the St. Lawrence River opposite Montreal to the New Hampshire border, from which another road, the Atlantic and St. Lawrence Railway, chartered by Maine and New Hampshire, was to extend to Portland; the two projects forming a continuous line. Surveys for the St. Lawrence and Atlantic were begun in 1846, under A. C. Morton, as engineer. Funds were difficult to secure however, and it was not until December 1848 that the first section, 30 miles, from Longueuil opposite Montreal to St. Haycinthe, was completed. In 1852 it was opened to Sherbrooke and in 1853 to the provincial boundary. This was the first completed link of the later Grand Trunk Railway. C. S. Gzowski, later Sir Casimir Gzowski, a Polish exile, trained in military engineering, was chief engineer, 1848 to 1853, acting also as general manager from 1851 on.

Many railway projects were now under consideration. A chief object from the beginning was rail connection from Nova Scotia to Quebec and on to Montreal and the west. The final outcome of this was the Interecolonial Railway, Halifax to Quebec and later to Montreal. Another project called the European and North American Railway, was for a line from Halifax via St. John to Portland. The line from Halifax to Quebec was to be built by the three provinces, Nova Scotia, New Brunswick and Canada, while the Portland line was to be undertaken by New Brunswick alone.

The Ontario, Simcoe and Huron, later called the Northern Railway, and the Great Western Railway projects were the first in Upper Canada. By 1850 there were 55 miles of railway in all Canada.

In 1849 a general act, called the Guarantee Act, was passed by the government of Canada. This act enabled guaranteeing of interest on cost of any railway of a minimum length of 75 miles. The guarantee was, in 1858, extended to the paying of principal, a first lien to be taken on railways so aided.

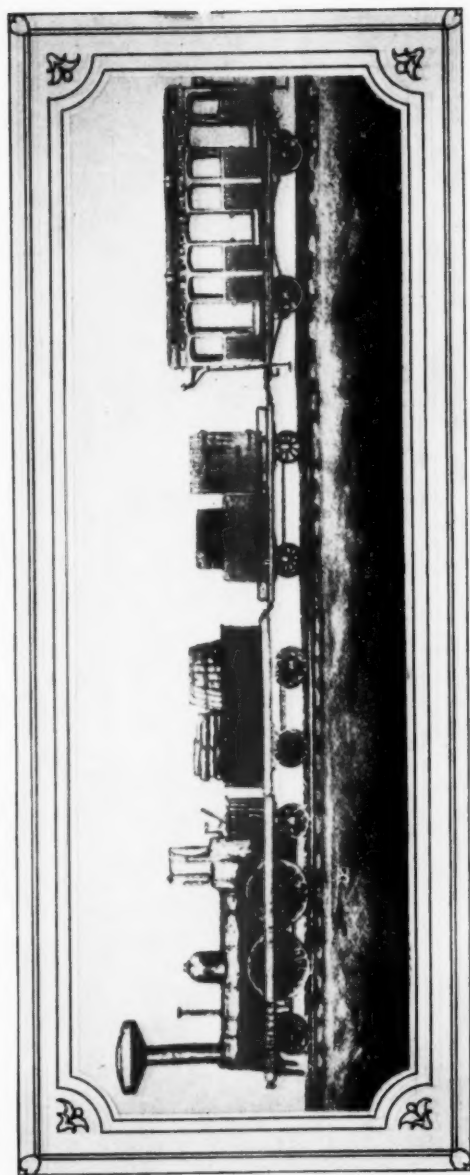


FIG. 1. FIRST TRAIN WITH ENGINE, CHAMPLAIN & ST. LAWRENCE RY., 1837.

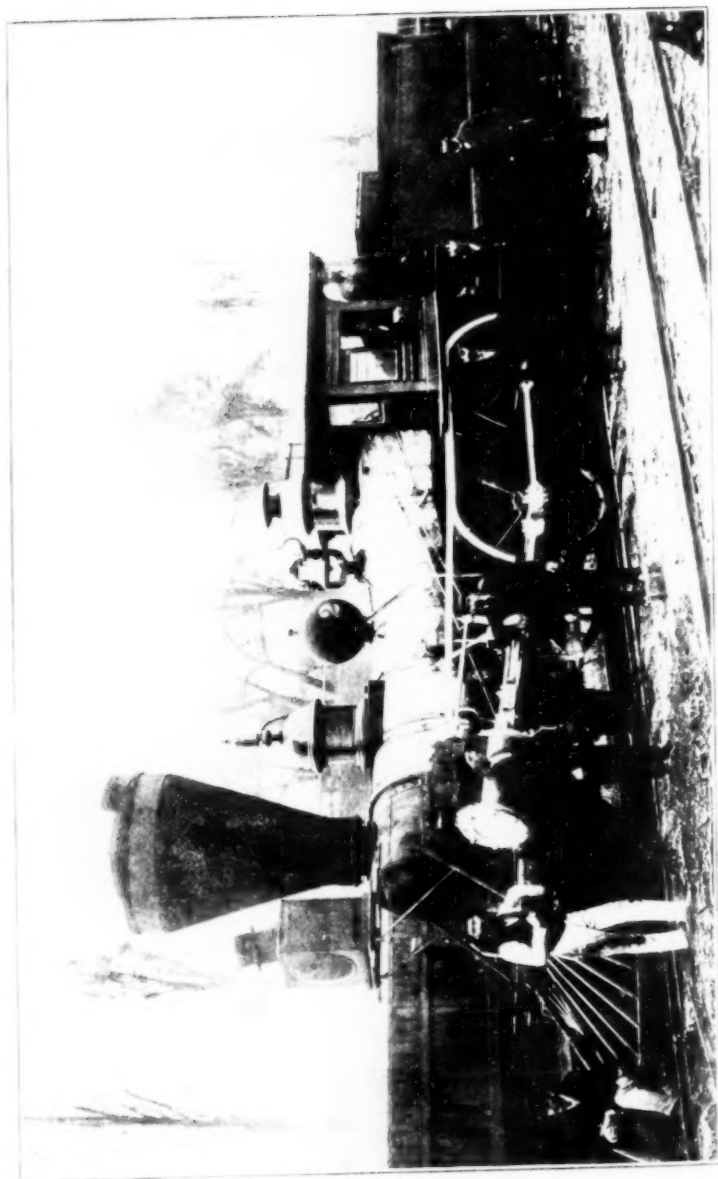


FIG. 11. EARLY WOODBURNER ON NORTHERN RY.

Note: At the entrance of the Toronto-Union Station, a *prairie* loaded at this station, with the following
 loaded on *Box 10* 1855 the *First Train* to *Godfrey* hauled by a *Steam locomotive*
 No. 10 and ran to *Amherst*.

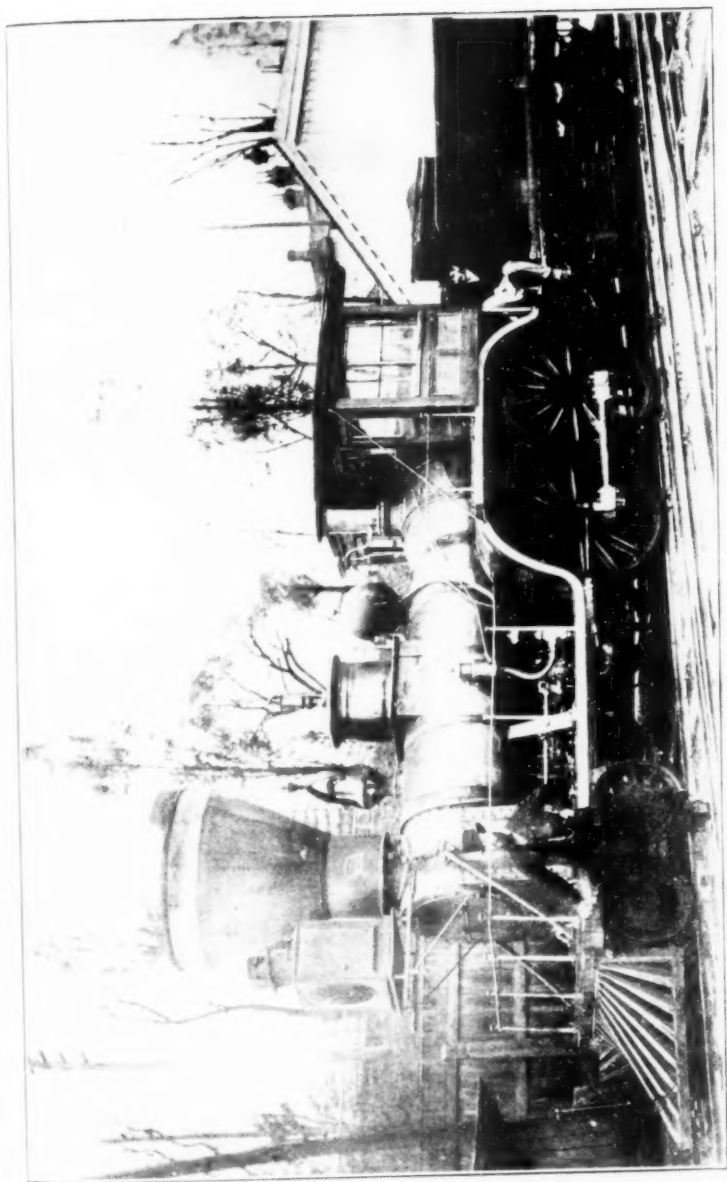


FIG. III. EARLY WOODBURNER ON GRAND TRUNK RY.

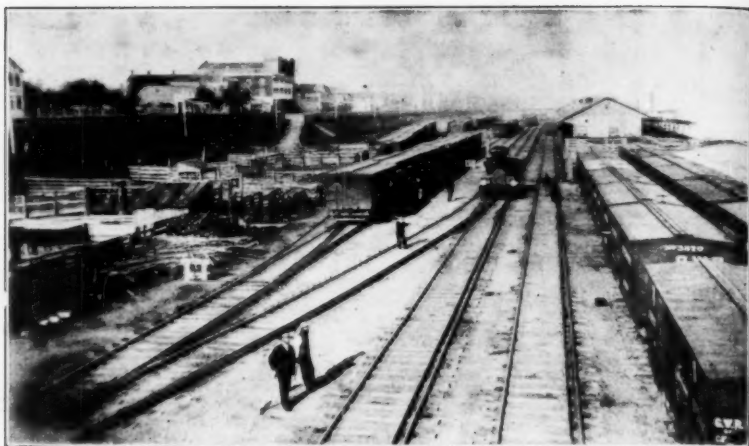
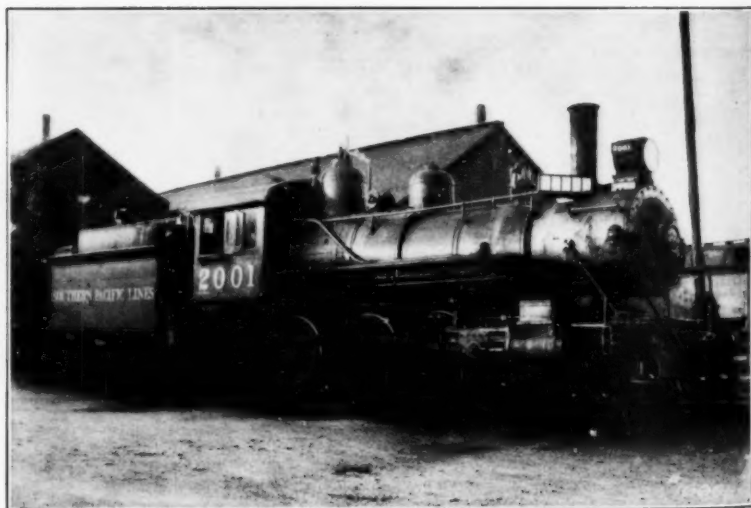


FIG. IV. GREAT WESTERN RY., WINDSOR, ABOUT 1865.



SOUTHERN PACIFIC LINES #2001.

At the inception of the Grand Trunk scheme the purpose, as already referred to, was to build a through railway from Halifax, traversing Nova Scotia and New Brunswick, and the length of Canada to its western boundary, the line to be owned by the three colonial governments, Nova Scotia, New Brunswick and Canada. To this end Joseph Howe of Nova Scotia went to England with a delegation, in 1850, and, after six months of persuasion, had a promise of guarantee from the British cabinet under which capital was to be forthcoming at $3\frac{1}{4}$ or $3\frac{1}{2}$ per cent on bonds from the provinces. A line from Halifax to Portland was to be included with the general project. All three provinces readily agreed, in 1851, to build the railway jointly, whereupon the cabinet of England, for some unexplained reason, declared that there had been a mistake, and that it could not proceed with the guarantee.

Later William Jackson, partner in a firm of noted British railway contractors, appeared before the Parliament of Canada, applied for a new charter and exclusive rights for his company for a through line of railway, and eventually carried his point, as will appear. In New Brunswick he was partially successful, but Nova Scotia would have nothing to do with him. In the latter province the first railways were built as government works, with money borrowed from England, and honestly and efficiently carried out.

In 1851 an act "To make provision for the construction of a main line of railway throughout the whole length of the province" was passed by the legislature of Canada. A board of Railway Commissioners was created, consisting of the Receiver General, the Inspector General, and the Commissioner and Assistant Commissioner of Public Works. In the same year the Kingston and Montreal Railway Company was incorporated with a capital of £600,000. (\$2,400,000). There was also a charter for a Kingston and Toronto Railway. Both of these charters were in control of A. T. Galt and associates, as was also the St. Lawrence and Atlantic with construction already well advanced. This would continue the line, on the east side of the St. Lawrence, from Montreal through Richmond to Portland, and the Quebec and Richmond Railway, (with charter owned by Quebec interests), would form the link between Richmond and Point Levis opposite Quebec.

A strong company of Canadian capitalists, consisting of John Young, Luther Holton and D. L. MacPherson of Montreal and A. T. Galt of Sherbrooke had the majority of stock subscribed and was ready to put through the entire line from Portland via Montreal to Toronto. Sir Francis Hincks, Inspector General in the government of Canada, however favored the English contractors Brassey, Peto, Betts and Jackson, who had become interested, considering them more dependable to be entrusted with so great an undertaking. This firm of railway builders had constructed about one-third of the railways of Britain as also railways in France, Germany, Spain, Italy and India. Thereupon, in 1852, a new act was passed, "To incorporate the Grand Trunk Railway of Canada" with capital of £3,000,000. with shares of £25., to build a railway over a designated route from Montreal to Toronto, with government guarantee

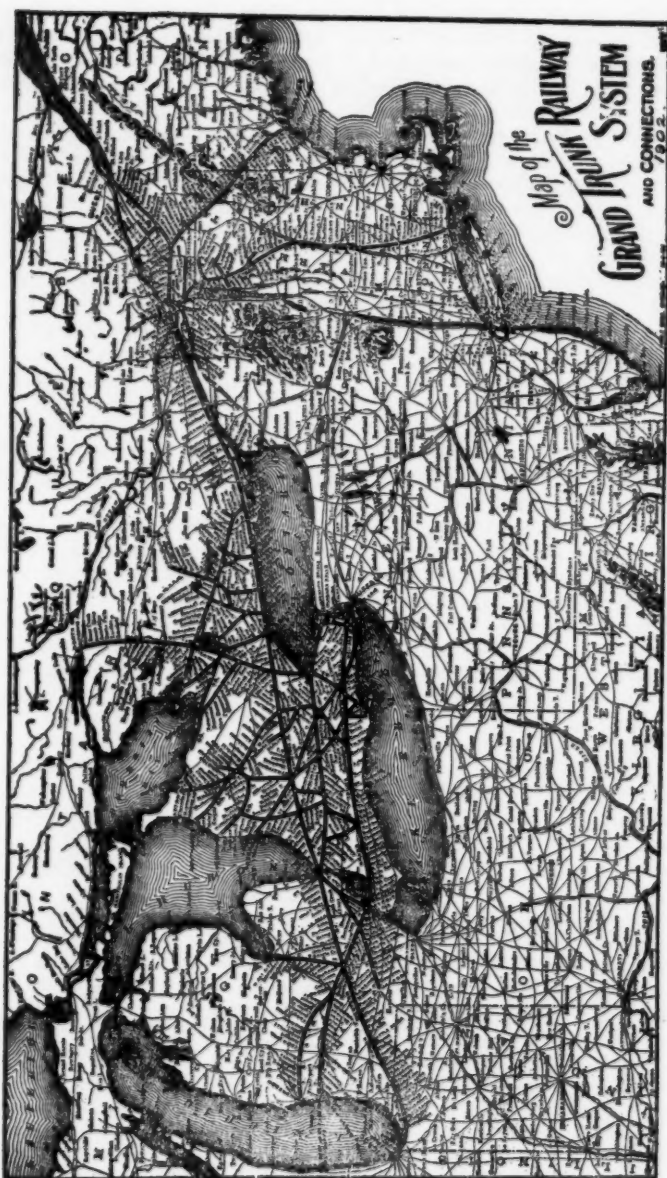


FIG. V.

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of £3,000 (\$12,000.) per mile. This charter marks the real beginning of railway building in Canada.

There were sundry other acts, and finally an amalgamation act, which repealed the Montreal and Kingston and Kingston and Toronto incorporations and enabled the Grand Trunk to absorb the various projects forming its main line from Portland, Maine, to Sarnia at the outlet of Lake Huron, and certain intersecting and tributary lines. From Toronto, westward, the first intention was to unite with the Great Western Railway, but negotiations failing, the route from Toronto via Guelph and Stratford to Sarnia, with a branch from St. Marys to London, was adopted. This tapping of Great Western Railway territory, especially at London, at once produced conflict, and the Grand Trunk and Great Western Railways were thenceforth rivals, until their amalgamation in 1882. The St. Lawrence and Atlantic section of the Montreal-Portland line was amalgamated with the main Grand Trunk, while the Atlantic and St. Lawrence was leased for 999 years on a basis of 6 per cent on the capital stock.

The English contractors now had complete control, and Galt and his associates could do nothing better than arrange with the dominant power. They secured fair consideration for their Montreal-Portland interests, and a valuable contract at the western end of the projected line. Management and control of this main trunk line, included in the cost of which and assumed by the shareholders were large expenses of promotion in the way of lobbying in Parliament and outlays incident thereto, in arranging with and paying costs of rival charter holders, and finally in unnecessarily costly construction, was thereafter, and for fifty odd years, vested in London away from and largely out of sympathy with local requirements, with lack of proper understanding and therefore inefficient management.

Negotiations were conducted in London in the first five months of 1853, and the Grand Trunk Railway Company of Canada was fairly started, with the support of English capital. The amalgamated company assumed the contracts, let in March 1853 and before, to the Brassey Company, for the line from Montreal to Toronto (334 miles) for £3,000,000 sterling; to the same company for construction of the Point Levis and Richmond line, 95 miles, for £650,000; for the Quebec and Trois Pistoles road, estimated at 153 miles, for £1,224,000; a contract for a bridge to cross the St. Lawrence at Montreal for £1,400,000; and also a contract to Gzowski, Holton, MacPherson and Galt for construction of the Toronto-Sarnia line, estimated at 172 miles, for £1,376,000.

The prospectus of the enterprise was issued in London while negotiations were under way under the guarantee of powerful local financial names and of seven members of the executive government of Canada. The capital stock was placed at £9,500,000. and profit was estimated at 11½ per cent. While the estimated gross receipts were later realized, the operating cost, estimated at 40 per cent, was 70 to 85 per cent, with no dividend available.

Construction was at once begun, and vigorously pushed. At one

time there were 14,000 men employed on railways in Upper Canada alone. In July 1853 the St. Lawrence and Atlantic section was completed; in 1854 the Quebec and Richmond section; in 1855 the main line was open to Brockville; in 1856 to Toronto and Stratford; in 1858 to London, and in 1859 to Sarnia. A line from Port Huron, opposite Sarnia, to Detroit, projected by individuals connected with the Grand Trunk directorate, was also opened in 1859. Early in 1860 this line was leased to the Grand Trunk for 999 years, on a basis of 8 per cent on an alleged cost of £450,000. The bridge at Montreal, named the Victoria Bridge, was begun in 1853 and regularly opened for traffic on December 19th, 1859. A short link, the Montreal and Lachine Railway, was opened for traffic in 1847—when it had an American locomotive which covered the 8 miles in 21 minutes—amalgamated with the Champlain and St. Lawrence in 1857, later leased, and finally, in 1872, sold to the Grand Trunk.

The first shareholders' meeting was called in Quebec July 27th, 1854, under Managing Director Sir C. P. Roney, Chief Engineer Alex M. Ross, and General Manager S. P. Bidder. The second annual shareholders' meeting was again in Quebec, September 5th, 1855. Subsequent annual meetings were regularly held in London.

The chief engineer's report, 1854, was, in part, as follows: Montreal-Toronto section, 333 miles: Land is purchased for 250 miles, also for Montreal station and for intermediate stations, about 3500 acres; for remaining 83 miles about 1000 acres are required; exorbitant prices are asked for land; at the crossing of Ottawa River outlet, St. Anne's to Vaudreuil, at southerly end of Montreal island, bridging is nearly 2200 feet, 949 men and 109 horses employed in construction, nearly all of the iron work, half the cost of the bridge, now completed in England and shipped; 7600 men and 1260 horses employed between Montreal and Toronto, of this 650 men and 62 horses on Montreal station, designed to meet future requirements for 1000 miles of railway. Toronto-Sarnia section: Toronto-Stratford, 89 miles, 1930 men employed; Walter Shanly resident engineer. Progress on Victoria Bridge. Quebec-Richmond section: Masonry throughout is superior a few iron bridges remain to be finished; passenger station and steamboat wharf advancing rapidly, delay in land purchase. Quebec-Trois Pistoles: Now located to Riviere du Loup; construction of first 40 miles to St. Thomas begun early in spring, one-third of grading is completed; masonry for large bridge is progressing; 1000 tons of rail received; 1142 men and 84 horses are now employed on this section. Montreal-Portland: Now in good running order throughout, trains are regular and reconstruction about completed; in 12 months ending July 1st, £275,000. was expended, one-third on road improvement, one-third on locomotives and cars, and remainder on payment of old debts.

The chief engineer's report September 1855 was: Montreal-Brockville; good construction, ready for operation in two months; Brockville-Belleville: 95 miles, masonry and station buildings to be completed this year, very little except laying and ballasting of track to be left for next

year; remaining 113 miles to Toronto, 40 miles at Toronto and heavy work well along, other part backward, along Toronto waterfront yet awaiting agreement with the city; Toronto-Stratford: work fast completing, Credit River bridge, largest west of Toronto, will require three months to complete, remaining work in full progress and of good quality; Stratford-St. Mary's: 12 miles well along, necessary to determine route to Sarnia; Quebec-Trois Pistoles: Work to St. Thomas, 40 miles, well forward, iron work for Etchemin bridge, 6 spans of 100 ft., lost at sea early in spring, replacement shipment daily expected, left England five weeks ago, opening of section will depend on completion of Etchemin bridge; Montreal-Portland: General progress reported, engine house and shops at Gorham burnt last January being rebuilt, one river bridge destroyed by spring floods for want of sufficient waterway, enlarged to double its former waterway, Berlin Falls branch graded, track laying to be completed, comment on absence of ocean steam communication with Portland.

The general manager reported scant business and general depression; that working expenses were a fraction over £11 per mile and that he hoped to reduce them to £10 per mile; that trains then running were capable of doubling actual receipts without material increase in cost, and that fares were reduced at opening of navigation, to compete with old established river and lake steamers, with good results.

An agreement dated January 21st, 1856, was concluded with the City of Toronto permitting Grand Trunk tracks along the waterfront to be proceeded with, on a width of 40 ft., and naming arbitrators, A. M. Ross and C. T. Keefer and a third to be named by them, to whom to submit any dispute. Article 17 of the agreement specifies that the city shall not require the Grand Trunk Railway to build bridges, ramps, crossings, etc., over or along the railway tracks, but shall provide all such.

With construction costs much greater than had been expected and business and returns far below anticipations, government interest charges defaulted, with the result that almost all the money advanced to railways under the Guarantee Act and the Grand Trunk advances finally became a gift rather than a loan. Francis Hincks' railway policy in total cost the government of Canada about \$33,000,000. in principal and interest.

During the American Civil War both the Grand Trunk and the Great Western lost heavily through depreciated currency.

Between 1859 and 1867 the Grand Trunk built directly only 43 miles of railway. Its policy became one of acquiring existing lines and these will be taken up, each with a brief sketch of its history, in the order in which they were acquired. For clarity, and following the method adopted in the arbitration preliminary to taking over the Grand Trunk and other railways by the government of Canada, in 1921, the general course of events will be considered in ten year periods, from 1860 on.

1860-1870.

The Three Rivers branch, from Victoriaville and the Richmond-Quebec line to the east bank of the St. Lawrence opposite Three Rivers, and the Waterloo, Que., branches were built, together some 42 miles. The two lines of the Montreal and Champlain Railway, Montreal to the international boundary, were leased in 1864, and purchased in 1872; the Ottawa and Prescott line, sold under foreclosure, was purchased in 1861. This line was leased to the Canadian Pacific Railway Company in 1881 and sold to that company in 1882.

An agreement was entered into in December 1864 with the Buffalo and Lake Huron Railway for division of traffic receipts. In 1869 this developed into a lease of the Buffalo and Lake Huron by the Grand Trunk, and later to full incorporation with the Grand Trunk. This cross-peninsular line extends from Fort Erie, opposite Buffalo, at the outlet of Lake Erie, to the harbor of Goderich, on the east shore of Lake Huron. It crossed the Great Western Railway at Paris and the Grand Trunk at Stratford. It was opened, Fort Erie to Stratford in 1856 and through to Goderich in 1858.

Mr. C. J. Brydges became managing director, located in Montreal, in 1862.

At the close of this decade the Grand Trunk Railway system operated 1431 miles, 955 miles of which were directly constructed by the company, the balance leased or purchased.

1870-1880.

The International Bridge, crossing the Niagara River from Black Rock to Bridgeburg was opened in 1873. It replaced the ferry previously in use and gave the Grand Trunk unbroken connection to Buffalo.

The Chaudiere Junction to Riviere du Loup line, chartered in 1852, opened for traffic in 1855, 1857 and 1860, a subsidiary of the Grand Trunk Railway of Canada, was sold by that company to the Dominion Government in 1879, to form part of the Intercolonial Railway.

Mr. E. P. Hannaford first appears as chief engineer in 1873. In his report for that year he states that about 200 miles of track have been relaid, mostly with English steel; that much ballasting has been done, cost of ballast in track being 30 cts. per yard; that nine iron bridges have been erected east of Montreal, replacing wood; that on December 31st, sixteen wooden bridges above 50 ft. span remained on Montreal-Portland line; that extension, from Doon to Galt, 6 miles, of part of the former Preston-Berlin line was opened for traffic in October; that 221 steel rails had broken or cracked to date, but that steel rails gave much better permanency to track than the former iron rails. He also reports on change of gauge and gives full tabulated rail report, as will appear later.

The following year eleven more wooden bridges were replaced by iron on the Montreal-Portland line, and a branch from near Danville Junction to near Lewiston, Me., 5½ miles, was opened for passenger

traffic July 13th. The chief engineer also reports that steel rails, then in use for five years, some of them nine years, had worn evenly, and in proportion to tonnage carried, much better than iron rails which wore very unevenly; also that there was much trouble from broken freight car wheels.

The Grand Trunk, after years of effort and contention opened a line through to Chicago, in 1879. Before that time it had connection from Detroit to Chicago over the Michigan Central, but the acquisition of the latter railway by Vanderbilt, New York Central, interests, rendered this connection impracticable. The new line was made up of several smaller roads, previously constructed, control of the stock of which was acquired by the Grand Trunk, and of connecting sections directly built by the Grand Trunk. This became the Chicago and Grand Trunk Railway.

By 1880 the Grand Trunk operated 1705 miles of railway, with a through line from Portland on the sea to Chicago. Of this mileage, 895 miles had been built by the company and the balance acquired or leased.

1880-1890.

This was the greatest period of acquisition and leasing other lines. The entire Great Western system, the great rival of the Grand Trunk in southwestern Ontario and for western business from and to the United States, was amalgamated with the Grand Trunk in 1882. The Great Western system consisted of a main line from Suspension Bridge and Toronto to Windsor, with numerous branch lines: The Wellington, Grey and Bruce, extending from Harrisburg, (and including Harrisburg-Galt and Galt-Guelph original parts), through Guelph to Southampton, and to Kincardine, branching from Palmerston, on Lake Huron; the Sarnia branch from London to Sarnia and Petrolia; the London, Huron and Bruce from Hyde Park just west of London to Wingham; the Canada Air Line Railway from Glencoe on main line 80 miles east of Windsor almost in a straight line to the International Bridge; the London and Port Stanley Railway (leased); the Welland Railway, Fort Colborne on Lake Erie to Port Dalhousie on Lake Ontario, crossing the main line at Merriton; and the Harrisburg, Brantford, Tilsonburg and Port Burwell line, (leased).

A subsidiary line, the main western feeder for the Great Western, was the Detroit and Milwaukee Railway, Detroit to Grand Haven on Lake Michigan and thence connecting by three steamers owned by the company with Milwaukee.

A part of what became the Great Western Railway had charter, as the London and Gore Railway Company, as early as 1834. This charter was revived in 1845 as the Great Western Railway, authorizing a line from the Niagara River across the province to the Detroit River. In 1853, eight years later, the line was opened from the Niagara River to London, and in the following year to Windsor, opposite Detroit, with ferry connection. In March 1855 the Suspension Bridge across the Niagara River was opened for traffic, giving connection with the New

York Central Railway. The Toronto-Hamilton connection was opened for traffic December 3rd, 1855.

An early charter gave the Great Western and the Michigan Central authority to construct a tunnel under the river at Detroit. Considerable preliminary work was done under E. S. Chesborough, engineer, but the nature of the under river soil was then considered impracticable and the project abandoned. After acquisition of the Great Western the main traffic route from Toronto westward was changed to go via Hamilton and London to Sarnia instead of via Guelph-Stratford as before.

A line from Port Dover to Stratford was opened in 1876, extended from Stratford to Palmerston in 1877, and from Palmerston to Warton on Georgian Bay in 1881, with a branch from Palmerston to Durham built in 1881. The whole became the Georgian Bay and Lake Erie Railway in 1881, in which year the Grand Trunk obtained stock control and took over operation under lease.

The Midland Railway comprised a line from Port Hope on Lake Ontario to Midland on Georgian Bay, with a number of branches and connections. It was opened from Port Hope to Lindsay as the Port Hope, Lindsay and Beaverton Railway, (chartered in 1846), in 1858, and finally through to Midland in 1875. In 1878-79 a line was built through from Belleville, via Peterborough, joining the previous line at Lindsay. This, through to Orillia and Midland, became the main line. A line Toronto-Coboconek (originally the Toronto and Nipissing Railway, built to 3 ft. 6 inch gauge, 40 pound rail), crossing the main line to Lorneville Junction, was opened for traffic in 1872. Small branch lines were: Peterboro-Lakefield, Whitby-Port Perry, Cobourg-Marmora crossing the Belleville line, (the Cobourg to Peterboro part was later abandoned), Victoria Junction-Haliburton, Victoria Junction-Port McNicoll, and Stouffville-Jackson Point. All these lines and branches became the Midland Railway, total mileage 472. The Midland system was leased to the Grand Trunk in 1884 and consolidated with that company in 1893.

There were now, and until the end of 1895, four engineering departments: the Grand Trunk Division with E. P. Hannaford chief engineer; the Great Western Division, Joseph Hobson chief engineer; the Midland Division, J. G. Macklin chief engineer; and the Detroit District and Michigan Air Line, George Mason chief engineer.

The Ontario, Simcoe and Huron Railway, the name of which was changed to the Northern Railway in 1858, with main line, 94 miles, from Toronto to Collingwood on Georgian Bay, chartered in 1849, was built a little ahead of the Great Western Railway. It was opened to Barrie on Lake Simcoe in 1853, and to Collingwood in 1854. In 1875 a northern extension, Barrie, Orillia, Gravenhurst, was opened for traffic. In 1872 there was a short western extension, Collingwood to Meaford, which duly became part of the Northern. At the end of 1877, the Hamilton and Northwestern Railway, Hamilton to Allandale near Barrie, was opened for traffic, and a branch, Beeton to Collingwood, was opened in 1879. A southern extension of the Hamilton and Northwestern was the Hamilton and Lake Erie, Hamilton to Port Dover, chartered in 1863, built about

ten years later and opened for traffic in 1875. In 1879 the Hamilton and Northwestern joined with the Northern and the two became the Northern and Northwestern with F. W. Cumberland, successful manager of the Northern, general manager of the joint company. The North Simcoe Railway, Colwell, west of Allandale, to Penetang, opened in 1880, was operated under lease by the Northern & Northwestern. In 1886, an extension from Gravenhurst to Nipissing Junction on the Canadian Pacific Railway was opened for traffic, and became part of the Northern and Northwestern operating system.

The whole Northern and Northwestern Railway System was united with the Grand Trunk Railway in 1888. The old Northern and the extension northward became the North-Bay-Toronto connection for the Canadian Pacific Railway for about twenty years, and as such gave lucrative business to the Grand Trunk until that company reached westward, invading Canadian Pacific territory, when the latter railway built its own connection, in 1904-1905, from Sudbury to a point on its Toronto-Owen Sound line.

The North Shore Railway, Montreal to Quebec, built in 1879 and 1881, was purchased by the Grand Trunk in 1882 and sold by that company in 1885, under pressure of the Federal Government, to the Canadian Pacific Railway Company.

In 1888 there was traffic arrangement with the Atchison, Topeka and Santa Fe Railway, then just extended to Chicago and joint use with that railway of the Grand Trunk (Dearborn St.) station, Chicago.

In 1890 an agreement with the Toronto Belt Line Company was arrived at.

At the close of this ten year period the Grand Trunk operated 4,213 miles, an increase of 2,500 miles for the ten years. Of the total, 1,204 miles was built by the company and the balance purchased or leased. The increase for the ten years included the Toledo, Saginaw and Muskegon, and the Cincinnati, Saginaw and Mackinaw Railways in the United States.

1890-1900.

The St. Clair tunnel, under the St. Clair River from Sarnia, Ontario, to Port Huron, Michigan, giving direct rail connection in place of the former car ferry, was opened for traffic in September 1891.

A grand Trunk branch line, Glencoe-Kingscourt, was built in 1893, and another short connection, from Parkhead on the Warton line to Owen Sound, in 1895.

By a general amalgamation act in 1893 fourteen leased and subsidiary lines were amalgamated with the Grand Trunk, with no change in operated mileage. These, with mileage, were as follows:

The Jacques Cartier Union Ry.	6.50 miles
The Montreal & Champlain Jct. Ry.	81.25 "
The Beauharnois Jct. Ry	19. "
The Midland Railway	479.25 "

The Peterboro and Chemong Lake Ry.	9.18	"
The Lake Simcoe Junction Ry.	26.50	"
The Grand Trunk Georgian Bay and Lake Erie Ry.	189.75	"
The London, Huron and Bruce Ry.	68.88	"
The Galt and Guelph Ry.	15.	"
The Brantford, Norfolk and Port Burwell Ry.	34.78	"
The Wellington, Grey & Bruce Ry.	168.	"
The Waterloo Junction Ry.	12.	"
((Waterloo to Elmira opened 1891. Berlin to Waterloo and Berlin to Galt, being extensions of part of old Preston-Berlin line, had been built by the Grand Trunk before.))		
The North Simcoe Railway	33.	"
The Cobourg, Blairton & Marmora Ry. & Mining Co.	14.50	"
Total	1,157.59	miles

On January 1st, 1896, new impetus came to the Grand Trunk Railway in the appointment of Charles Melville Hays as general manager, succeeding L. J. Seargeant who went to London to act in an advisory capacity to the board of directors. On the same day Joseph Hobson became chief engineer of the entire Grand Trunk system east of Detroit. Mr. Hays came from the Wabash Railway where, as vice-president and general manager, he had shown exceptional ability. He at once proceeded with changes and improvements which had been for some time under discussion, notably physical improvement, replacement of the Niagara Suspension Bridge with a massive steel arch, and of the Victoria Bridge tubular superstructure by heavy, modern capacity trusses, etc., instituted an era of progress in general and became the dominant force on the Grand Trunk Railway, so remaining for the time he was connected with it.

In August 1897 the Niagara arch bridge was completed and in December of the following year trains began to use the double track of the new superstructure of the Victoria bridge, thereafter called the Victoria Jubilee Bridge.

In 1898, use of the Grand Trunk from Toronto to Hamilton, for non-stop through traffic, was given the Canadian Pacific Railway, on rental basis, which continues.

In 1900 the Chicago & Grand Trunk Ry., controlled by the Grand Trunk Railway of Canada was sold under foreclosure, incorporated under new title of Grand Trunk Western, and operated by a receiver for eleven months until December 1st, after that by the reorganized company.

Stock control of the Central Vermont Railway was secured by the Grand Trunk in 1899.

In 1900, 4,198 miles of railway were operated by the Grand Trunk, 1,238 miles built by the company and 2,960 miles acquired. The slight decrease from the last ten year period is due to expiration of lease of the London & Port Stanley (24 miles), abandonment of 46 miles in various sections, and addition of 54 miles in the Glencoe-Kingscourt and the Parkerhead-Owen Sound branches.

1900-1910.

In January 1901, Mr. Hayes left the Grand Trunk to become president of the Southern Pacific Railway. In the latter part of the same year he resigned this presidency, and returned to the Grand Trunk as second vice-president, and again general manager.

The Grand Trunk Pacific project, a transcontinental line, approved, notably on the judgment of General Manager Hays, by the Grand Trunk Railway of Canada shareholders at a special meeting in London in March 1904, was for a line of approximately 3,400 miles from Moncton in New Brunswick, through Quebec, Winnipeg in Manitoba, and Edmonton in Alberta, to Port Simpson, or near there, on the Pacific coast, utilizing in large part a route that had at first been intended for the Canadian Pacific, with crossing of the Rocky mountains at elevation much lower than any other transcontinental line, and in general with easier grades throughout.

The project was in two main divisions, the Eastern Division, Moncton to Winnipeg, 1,900 miles, to be built and owned by the Government of Canada and leased to the Grand Trunk, and the Western Division, Winnipeg to the Pacific coast, 1500 miles, to be built and owned by the company. The Eastern Division, Moncton to Winnipeg, was to be let to the Grand Trunk for fifty years; for the first seven years free of charge and for forty-three years at rent of three per cent on cost. The route almost due west from Quebec is one hundred to one hundred and fifty miles north of the Great Lakes with connections from the main line, one to North Bay and one to Fort William on Lake Superior, and well to the north of the Canadian Pacific main line in the West. From Montreal to Yokohama the route by the western terminus of the Grand Trunk Pacific is 500 miles shorter than the Canadian Pacific via Vancouver, and 1500 miles shorter than from New York to Yokohama via San Francisco. By 1906 construction was well under way on the long stretch between Edmonton and Winnipeg, and by July 1910 passenger service on this section, 796 miles, was in operation. The government section, from Winnipeg east, had also made fair progress.

An important acquisition of the Grand Trunk in this decade was the Canada Atlantic, 400 miles of main line from the Swanton, Vt., connection with the Vermont Central to Depot Harbour, and 63 miles of branches. The Coteau and Province Line Railway and Bridge Co. was chartered in 1872. Under this and other charters various sections were built, 1882 to 1885, from Coteau to Ottawa and southeasterly to the international boundary at Swanton, Vt., to form the Canada Atlantic Railway of which the Grand Trunk acquired control in 1905 and which was finally consolidated with the Grand Trunk in 1914. Two small extensions, Glen Robertson-Hawkesbury built in 1892, and South Indian-Rockland, built in 1896, were leased to the Canada Atlantic in 1899. In the same year the through line Ottawa-Arnprior-Parry Sound, (the terminus being Depot Harbor on Georgian Bay, near Parry Sound), with its branch Golden Lake-Pembroke, was amalgamated with the Cana-

da Atlantic. John R. Booth, lumberman and capitalist of Ottawa, who died December 1925, built most of the Ottawa-Parry Sound line, in 1895-1897. The Pembroke-Golden Lake branch was built two years later.

The Canada Atlantic was considered a material part of the eastern connecting system of the Grand Trunk Pacific scheme.

In 1904 there was built and brought into service a small connection, Lynden, on the old Great Western, to Brantford, 4.09 miles of new track, which changed the main line route to run through Brantford, slightly increasing mileage, instead of through Harrisburg as before. From Brantford to Paris the old Buffalo and Lake Huron, improved in grade and general construction, serves. The City of Brantford contributed a net bonus of \$55,500 toward this change, to be on the main line west.

In 1907 Joseph Hobson resigned as chief engineer and retired from active work. He was succeeded by Howard G. Kelley. In the same year the Grand Trunk Pension Fund was instituted, beginning with a sum of £40,000.

Many new passenger stations are mentioned as built, in annual reports, fifteen in 1906, seventeen in 1908, sixteen in 1909.

In 1909 Charles M. Hays was elected President of the Grand Trunk and the Grand Trunk Pacific, etc., with office in Montreal, and Alfred W. Smithers became chairman of the Board of Directors in London. Presidents up to this time had been as follows:

1852-62 Hon. John Ross (Canadian)

1862-66 Sir E. W. Watkin, Bart.

1866-72 Richard Potter

1872-95 Sir Henry W. Tyler

1895-1909 Sir C. Rivers Wilson.

The Pontiac, Oxford & Northern in Michigan was purchased in 1909 as an addition to the Grand Trunk Western.

In 1910 the total operated mileage was 4,748; 1,227 miles built by the company and 3,521 miles acquired.

1910-1921.

In 1911 H. H. Safford succeeded Howard G. Kelley as chief engineer.

On April 15th, 1912, President Charles M. Hays lost his life through the foundering in mid-Atlantic of the White Star Steamship "Titanic". The death of Mr. Hays was an irreparable loss to the great railway enterprise of which he was the head. The Board of Directors, meeting in London May 3rd following, recorded their high appreciation of his great and exceptional services to the Grand Trunk and the Grand Trunk Pacific Railway Companies.

In Canadian Transportation history there appear three great railway administrators: Sir William Van Horne, builder and establisher of the Canadian Pacific Railway; Charles Melville Hays, President of the Grand Trunk Railway and of the Grand Trunk Pacific and Sir Henry Worth Thornton, President Canadian National Railways.

At the regular meeting of the Board of Directors, June 30th, 1912, Edson J. Chamberlain was elected president of the Grand Trunk and of the Grand Trunk Pacific. Mr. Chamberlain had been vice-president and general manager of the Grand Trunk Pacific since 1908. He retired September 1st, 1917 when Howard G. Kelley became president.

Heavy grade separation work was done in Toronto for several years, notably in 1911 and 1912. The new Union Station at Ottawa was occupied early in the year 1912 and completed in October of that year. On June 1st, the same year, the Grand Trunk hotel in Ottawa, the Chateau Laurier, was formally opened.

The Grand Trunk Pacific also built hotels; the Fort Garry in Winnipeg, the MacDonald in Edmonton and others.

In 1913 a short branch from Birch on the Penetang line to Midland was put in operation, and Midland soon became the chief lake terminus of this part of the Grand Trunk. In Michigan a line from Cass City to Bad Axe was built by the Grand Trunk Western and opened in 1913, and a line from Palmer, Mass., to Providence, R. I., was begun by the Vermont Central, but later work on this was suspended.

In 1918 the Grand Trunk Western and the Detroit, Grand Haven and Milwaukee Railways were taken over for operation by the government of the United States.

Many new stations were built during this decade, nineteen reported in 1911, including the large Guelph and Stratford stations, eighteen in 1912, twelve in 1913, twelve in 1915, six in 1916, seventeen in 1917, twelve in 1918 and fifteen in 1919.

In 1921, at the end of its separate corporate existence when it was merged with the Canadian National Railways under government ownership and operation, the Grand Trunk Railway of Canada operated approximately 4,781 miles of railway; 1,260 miles constructed by the company and 3,521 miles acquired.

Of the new transcontinental railway the name Grand Trunk Pacific came to be applied to the Western Division only, Winnipeg-Prince Rupert, built by the Grand Trunk, while the Eastern Division, Moncton-Quebec-Winnipeg was called the National Transcontinental. On both the Grand Trunk Pacific and the National Transcontinental construction steadily progressed. In 1911 track was laid on the continental summit, Yellow Head Pass. In the same year connection from the Transcontinental main line at Cochrane, to North Bay, over the Temiskaming & Northern Ontario Railway, a line owned and operated by the Province of Ontario, was made by agreement. This gave the desired direct connection from the west to Toronto. In the autumn of 1914 bi-weekly train service was established between Prince Rupert, the Pacific terminus, Edmonton and Winnipeg. The last spike in completion of the track, Winnipeg to Prince Rupert, had been driven April 7th, at Nechaco River crossing, 375 miles from Prince Rupert and 1,375 miles from Winnipeg. Grand Trunk Pacific branch lines to this date comprised a total of 1,059 miles. The chief engineer in charge of construction was B. B. Kelliher.

On November 18th, regular service between Levis, Quebec, and Moncton, N. B., began on the National Transcontinental line. The Quebec to Winnipeg part was also practically complete, but not yet operated. The gap remaining, Moncton-Winnipeg, was the Quebec bridge. Total cost, originally estimated at \$61,415,000 had by this time reached \$161,300,000. To this result scarcity of and large increase in the cost of labor largely contributed. There were also rock and other material classifications, differing from original specifications, by which contractors gained largely with result of added cost.

The Grand Trunk, in difficulty with the Grand Trunk Pacific, did not see its way to take over operation of the National Transcontinental part, of which the cost had been so greatly in excess of original estimates, and on which business, largely due to the war, was insufficient to pay operating costs, whereupon the Department of Railways took over administration. In 1915 train service between Superior Junction, near Winnipeg, and Quebec began on June 1st, and to Toronto by way of the Temiskaming and Northern Ontario Railway on July 15th.

Increasing difficulties, both on the Grand Trunk proper and the Grand Trunk Pacific, on which latter the operating deficit had risen to over \$2,000,000 per annum, and fixed charges to \$7,200,000, rendered it impossible for the Grand Trunk Railway of Canada to continue after 1919. Since early in 1918 negotiations for purchase of the railway by the government of Canada had been proceeding and now came an agreement, specifying arbitration to fix the sale price of common and preferred stock. Meanwhile a receiver was appointed for the Grand Trunk Pacific.

At the beginning of the Grand Trunk Pacific project, Mr. Hays had intended to build west from North Bay only. Under strong political pressure the project was extended eastward to Quebec and finally to Moncton. This much larger undertaking gave superfluous mileage, likely to be unremunerative for a long time. A serious curtailment of Grand Trunk Pacific business resulted from the invasion of its territory by both Canadian Pacific and Canadian Northern Railway branch lines, and this on financial support by the government, a breach of the original tentative guarantee as adjudged by the Grand Trunk. The untimely death of the original projector, Charles M. Hays, and later the Great War, were further great handicaps to the success of the Grand Trunk Pacific Railway.

Preceding the Grand Trunk Pacific undertaking there had been negotiations at various times, by Mr. Hays with the Canadian Northern, Mackenzie and Mann, railways, which had extensive lines in the west, culminating in an offer to sell out to the Grand Trunk at about \$30,000 per mile. This offer the Grand Trunk directors declined, leaving no other course open but to build, if the vital western business was to be obtained.

The arbitration board, Sir Walter Cassels, Judge of the Exchequer Court, chairman; Sir Thomas White for the government; and Ex-President of the United States W. H. Taft for the Grand Trunk, finally

brought in their award in 1921, adjudging the common and preference stock of no value, with minority report by Ex-President Taft giving the value of the said stock as \$48,000,000. Government ownership and operation of all Grand Trunk and Grand Trunk Pacific lines as also of the former Canadian Northern Railway, and the Intercolonial Railway etc. was complete in 1921, the organization being known as the Canadian National Railways, with total mileage 22,468, including the Central Vermont and other lines in the United States, 3328 locomotives and 137350 cars. In 1922 Sir Henry Worth Thornton formerly of the Pennsylvania Railway, later general manager of the Great Eastern Railway, England, in charge of railways in France during the war, and afterward Inspector General of transportation in England, was appointed Chairman and President, and so continues. The head office of the Canadian National Railways is the former head office of the Grand Trunk Railway, McGill Street, Montreal.

The original construction of the Grand Trunk main line was very substantial; materially better than general American construction of that day; modelled on the best English practice and so specified on the Montreal to Toronto part. West of Toronto, while reference to English standards was omitted in contracts, work was also most substantial throughout. Detail location of the line was left to the contractors, subject to the approval of the government engineer.

On the gauge of track there was much discussion. The question was between the general American standard, 4 ft. 8½ inch, the English so called narrow gauge, and the Brunel 7 ft. gauge. Weight of evidence was in favor of 4 ft. 8½ inch, while a gauge of 5 ft. 6 inch was adopted. Several engineers were consulted. T. C. Keefer cited authorities, including Robert Stephenson, in favor of the narrow gauge. A Royal Commission appointed in 1845 favored the narrow gauge. It was advocated by H. C. Seymour, state engineer of New York, as permitting connection with United States railways, while in other respects a wider gauge was preferable. John A. Roebling demonstrated the narrow gauge as safer for curves by reason of less slip of outer wheel and therefore less tendency to derailment; he recommended a gauge of 5 ft. 3 inch to 5 ft. 8 inch. A 5 ft. 6 inch gauge had already been adopted on the Portland-Montreal line. The Railway Committee of the Canadian Parliament finally, on July 31st, 1851, with all evidence before them, by a vote of 9 to 2 decided on the 5 ft. 6 inch gauge and this became the standard gauge of the Grand Trunk and of Canadian railways generally.

The Great Western Railway, which wanted the 4 ft. 8½ inch gauge for connection with railways at its New York State and Michigan ends, was virtually compelled by the government to a 5 ft. 6 inch gauge. It solved its difficulty by means of an inner rail giving additional gauge of 4 ft. 8½ inch.

In 1864 the Grand Trunk also laid a third rail to 4 ft. 8½ inch gauge from Sarnia to Stratford on its main line and continuing from there to Buffalo on the Buffalo and Lake Huron line. The Detroit-Port Huron line was built to 4 ft. 8½ inch gauge.

In 1872 the narrower gauge was made standard Sarnia to Buffalo, and also on the St. Marys-London branch. In 1873 the 4 ft. 8½ inch gauge was extended on all Grand Trunk lines west of Montreal. From Stratford to Montreal, 421 miles, and 60 miles of sidings, this was done on the 3rd and 4th of October, the work being completed in twenty hours and causing only sixteen hours interruption of traffic. In 1874 the narrowing of the gauge was carried out east of Montreal, mainly on the 25th and 26th of September, giving uniform gauge of 4 ft. 8½ inch over the whole line.

On the Great Western, as also on the Grand Trunk, Sarnia-Stratford-Buffalo, the adoption of the 4 ft. 6 inch gauge required only the taking up of one outer rail and the simplification of switches and inter-sections.

The first rail used was the English pear shape, soon followed by the inverted U-Section, (see fig. 2. pl. 2). English bullhead rails do not appear to have been used on the Grand Trunk at any time. Material was all wrought iron until 1862 when iron with steel face was tried, and not long used. The first all steel rail came in 1865. The Grand Trunk rail purchase record up to 1873 shows as follows:

1850—60	lb.	pear shape	—	iron.	Chair joint
1854—63	"	"U"	"	"	Special chair joint
1859—60	"	"T"	rail	"	Fish plate joint
1860—63.3	"	"	"	"	"
1860—65	"	"	"	"	"
1862—75	"	"	"4 ½"	"	"
1862—70.7	"	"	"	"	with steel face. Fish plate joint.
1865—63.5	"	"	"	"	Fish plate joint
1865—	"	"	"	steel.	"
1867—75	"	"	"4"	iron.	"
1868—75	"	"	"4 ¾"	"	"
1869—64	"	"	"	steel.	"
1869—77	"	pear shape	—	"	"
1870—65	"	"T"	rail	"	"
1873—60	"	"	"	"	"

Rails in track December 31st, 1873, were reported by E. P. Hannaford, chief engineer as follows:

District	Fish jointed steel rail T.	Fish jointed iron rail T.	U-Rail	T-Rail in chairs	Total Miles
Detroit	15	44	—	—	59
Western	37	84	19	—	190
Central	269 ¾	63 ¼	—	—	333
Buffalo-Goderich	32	118	—	11	161
Galt Branch	—	7	6	—	13
Champlain & Bonaventure Br.	10	10	—	64	84
Island Pond	83 ½	60 ½	—	—	144
Quebec-Richmond	27 ¾	22	4	42 ¾	96
Riviere du Loup	1 ½	—	112 ½	4	118
Athabasca	—	5	12	18	35
Portland	—	150	—	—	150
	526 ½	563 ¾	153 ½	139 ¾	1383

As late as the end of 1886, the chief engineers report showed 113 $\frac{1}{4}$ miles of iron rails still in track.

The more modern sections were first arranged for between 1876 and 1880, purchases being largely 65 lb., and fitted with angle bar joints. In 1888 a 72 lb. G.T.R. design was purchased. It was revised during the two following years to a 78 lb. and 79 lb. section of which many miles are still in track.

About 1896 the 80 lb. Am. Soc. C.E. section was purchased. In 1900 a special 90 lb. rail with extra wide base was purchased for use on a section where soft foundation had given trouble.

In 1902 the first 100 lb. rail was purchased and used through the Sarnia tunnel.

In 1904 the first purchase of 100 lb. Am. Soc. C.E. section was made and purchases continued until 1914.

In 1914 a quantity of 90 lb. Am. Ry. Assoc'n. -A- section was purchased for use on some of the more important branch lines and in this same year 100 lb. ARA-A was first purchased. This section is still the main line standard.

During 1915-16-17, when Canadian steel mills were under special government control on account of war conditions the only rail rolled was 85 lb. Can. Pacific Ry. section, and it was used during that period by all Canadian railways requiring rail.

Increase of business required double tracking, first on the line between Montreal and Toronto. By September 1890, 170 $\frac{1}{2}$ miles of this was completed, and in 1891 it was extended to 203 $\frac{1}{4}$ miles. In the next following years not much was done. In 1899 the only single track remaining between Montreal and Toronto was 46 $\frac{1}{4}$ miles between Port Hope and Port Union. In 1903 double track Montreal-Toronto is reported as finished, and also that it extends to Niagara, giving continuous double track from Montreal to the Niagara River. In the same year double tracking was completed, all but a few miles, Port Huron to Chicago, on the Grand Trunk Western. In 1904 double track is reported almost completed west of Hamilton, leaving only 50 miles of single track between Hamilton and Sarnia. In 1907 double track between St. Lambert and Victoria Bridge is reported as used jointly by the Grand Trunk and the Intercolonial. In 1909 double track extended eastward to St. Rosalie Station, 38.01 miles from Victoria Bridge. Finally in 1917 double track was completed, St. Rosalie to Chicago and to the Niagara River except for the single track St. Clair tunnel and about five miles in Indiana.

Engines for the Grand Trunk were first built at the Canada Works, Birkenhead, England, and later at the Point St. Charles shops, at Montreal. Weight of the early engines, 1853, was in the vicinity of 25 tons. This increased from time to time, in common with engine weights on American railways until in 1904 a weight of 104 tons is noted. Engine weights can be followed from the Grand Trunk bridge specifications. In 1892 the Cooper E.40 loading was used, and this engine weight continued until increased in 1900 to E.45 basis. In 1907 the newly issued Am. Ry. Engineering Assocn. specification with Cooper E.50 loading was

adopted, revised in 1910 to E.50 and E.60 basis, which practically continues.

Wood burning locomotives, with large stacks for spark arresters, were used altogether on Canadian railways up to about 1873 in which year the first coal burning engine, changed from wood burning in the shops at Stratford, was put into service. The change from wood to coal burning took several years and was coincident with altering, or scrapping and replacing, for change of gauge. During the wood burning period, about twenty years, enormous quantities of the finest hardwoods were consumed, the heaviest forestations on the old main line being between Toronto and Sarnia. The railway thus afforded a ready market for the produce of the settlers clearing operations. At Stratford in a record year 16436 cords of wood were issued. This represents a compact pile of cord wood 40 ft. wide, 20 ft. high and almost exactly half a mile long.

Of the five crossings of the St. Lawrence waterway, in order of location from downstream, the Victoria Bridge at Montreal, the Coteau Bridge on the Swanton, Vt.-Ottawa line, the Suspension Bridge below Niagara Falls, the International Bridge at Buffalo and the St. Clair Tunnel at the outlet of Lake Huron, all built by or for the use of the original Grand Trunk Railway or its constituent parts, the two first being wholly in Canada and the latter three crossing the international boundary line, the first to be put in service was the Suspension Bridge, and this was in 1855, for the Great Western Railway.

This bridge was built and owned by an independent company for whom John A. Roebling, the great pioneer in and later proponent of the art of suspension bridge building, was engineer. It was the first, and so far only suspension bridge built to carry a full main line railway load.

The place of location of the Suspension Bridge, about two miles below Niagara Falls, was, on the New York side, called Suspension Bridge and this name continues although the old bridge disappeared almost thirty years ago. This bridge spanned the gorge of the river, here about 210 ft. deep. It had an upper single track railway deck and 17 ft. below this a carriage way of 19 ft. width between posts. A continuous truss 820 ft. long, with posts spaced 5 ft. longitudinally, rod braced, and having wooden floors both for the railway above and for the enclosed roadway below, extended the length of the span, and was carried by four cables, two on each side, supported on solid masonry towers. Each cable was composed of seven strands of 520 scant No. 9 wires, a total of 3,640 wires, each individual wire continuous, ends being carefully spliced throughout the length of the cable. The cables were in two pairs, upper and lower, the upper pair having a versed sine of 54 ft. and the lower 64 ft. To aid lateral stability they were hung in inclined planes, converging inward from the towers. The towers, built of limestone quarried near the site of the bridge, were in shape truncated cones, were 90 ft. high on the New York side and 80 ft. on the Canada side where the rock was 10 ft. higher. The top of each tower was covered with a cast iron plate on which rested rollers supporting the cast iron saddle carrying the cables.

The Suspension Bridge served for 42 years, from 1855 to 1897, and in latter years far beyond its original intended capacity of loading. In 1880 the wooden stiffening truss was replaced by a steel truss and in 1886 the disintegrating masonry towers were replaced by towers each made up of four wrought iron braced columns, both changes being made under direction of L. L. Buck, M. Am. Soc. C. E. as engineer.

Finally increasing traffic and heavy loading imperatively called for an entire new structure, for which Mr. L. L. Buck designed the massive double track arch still in use. This was taken in hand early in 1896 and opened for traffic in July 1897.

The Niagara Railway arch has span of 550 ft. between centres of end bearings, is of braced spandrel, three hinge design with 115 ft. trusses, one at each end, to bank abutments. It carries two modern capacity railway tracks on top and a roadway with trolley tracks below.

The full history of the Suspension bridge and its replacement by the arch bridge is given in the Transactions of the American Society of Civil Engineers. (Vol. XVII 1887 and Vol. XL 1898.)

THE VICTORIA BRIDGE.

From the beginning of the Grand Trunk Railway project it was evident that a bridge across the St. Lawrence River was a necessity, and that this bridge should be at or near Montreal. The Railway was incomplete confined to the North Shore. From the head of Lake Superior to the Atlantic Ocean there was no bridge over the river except at the Niagara Gorge.

As early as 1846 the Hon. John Young of Montreal suggested the practicability and necessity of a railway bridge near Montreal. There were successive reports from engineers: Morton in 1846, Gay in 1847, Gzowski in 1849, and T. C. Keefer. On these reports and on information obtained at the site, A. M. Ross, on his return to England, designed the bridge, on the tubular girder plan on which it was built; as chief engineer of the Grand Trunk Railway he afterwards resided in Canada until the bridge was completed.

The great importance of the project and large cost involved decided the Grand Trunk Railway directors to consult Robert Stephenson, builder of the Menai Straits tubular bridge. Stephenson approved Ross' plans and joined as engineer.

In the summer of 1853 Stephenson visited Canada to personally examine the bridge site, deciding conjointly with Mr. Ross on location, the down stream end of the La Prairie basin at the west end of Montreal harbor. The opening, shore to shore is 8660 ft. The water is shallow, and full of boulders. Mid shoals divide the riverbed into two channels, causing great difficulty in delivery of construction material by boat, having to pass down one channel about a mile, and up the other against a current of 7 to 8 miles an hour. The bottom is solid rock for about 1900 ft. out from the north shore and 600 ft. from the south shore, free from deposit excepting the large boulders. Toward the centre there is

shale, clay and quicksand overlaid by a kind of hard pan, 12 to 14 ft. thick.

The most serious difficulty in construction was the ice. Before the final freezing up of the river there is what is called shoving, a final movement of the ice, before solidification. In the spring before break up there is another shove or movement of the whole mass. Anchor ice, called frazil, forming in the swift current, in elongated, stringy particles, denser than surface ice, is liable to collect in large masses.

The piers were designed with long toes upstream, with inclined, wedge caps, against which large floes slide up with the swift current and break. This style of pier was generally used, even for smaller rivers, in the old Grand Trunk bridges. At the Vaudreuil Bridge spanning the outlet of the Ottawa into the St. Lawrence river, six piers on an island, only flooded during very high water, were not provided with ice breaker toes. In 1855 the river rose high; ice of the lake of the Two Mountains, not far above, came down in a mass, and slowly moved the upper parts of the piers 2 ft. downstream. The piers were rebuilt with ice breaker toes.

For the Victoria Bridge there are 24 piers and the north and south abutment. On these rested the 25 spans of the bridge, 24 of 242 to 247 ft. span, and a centre span of 330 ft. Piers are numbered from the north shore.

Suitable stone for piers was found at Caughnawaga, on the south shore, not far from the bridge, on land belonging to the Indians, from whom it was purchased. Quarries were also opened at Point Claire, north shore, 16 miles west of the bridge. The stone was at first all brought down on the river; by barges and paddlewheel tugs, later by Grand Trunk railway line passing near the quarry. It is hard limestone, black in fracture, light grey when tooled and after exposure to the weather for a number of years. Depth of water at the bridge site was found to be 5 to 15 ft. at summer level. The limestone riverbed with large boulders suggested the expedient of floating cofferdams, which could be constructed on shore in winter season and later launched and floated to place. These cofferdams 188 by 90 ft. in out to out horizontal dimensions and 12 to 16 ft. deep had double walls and were framed of heavy timber (See pl. 1). The downstream end was detachable so that after completion of a pier the cofferdam could again be floated and towed to a place of safety for use next season. The draft, when floating was about 18 inches, but even this light draft did not always clear the boulders. At spacing of 20 ft., along the walls of the cofferdam caisson, spuds, moving in grooves slid to the bottom of the river, for anchorage. Ten or twelve of these spuds in each caisson were centre bored and had 2" iron bars inserted, and drilled into the rock of the river bottom. The caissons were then scuttled and sunk to place, generally first resting on boulders, which had to be removed with much difficulty. The two walls of the caisson, with bracing between them, gave stability. The 4 ft. puddle chamber was formed by 3 in. sheet piling along the inner wall of the caisson and 4 ft. within this, 6 in. sheet piling driven along waling pieces held in place

by iron brackets projecting from the caisson wall, all sheet piling being driven down to river bottom (See pl. 2). Cofferdams for the north abutment were formed in the same manner. There were six caissons, each 20 by 150 ft., two on each side and two across ends. They were constructed on the bank of the Lachine Canal and were ready for launching early in May.

Early in 1854, the ice having formed, the position of piers was marked on the surface and soundings taken with rods through holes cut in the ice. Some of these soundings were erroneous on account of the swift current and anchor ice. The deepest sounding was 18 ft., at Pier 13. At the centre of each pier location an iron pin, 5 ft. long and 4 inches in diameter, was bored into the bed of the river $3\frac{1}{2}$ to 4 ft. A level road was made along the centre line of the bridge over the rough ice.

The men brought from England suffered severely with the rigorous climate. The hard pan toward centre of the river was first taken for continuation of the rock bottom, and later gave much trouble in sinking piers through it and the underlying sand and clay to bed rock.

Crib work of heavy timbers filled with stone, a colonial device then new to the English engineers, was framed on the ice. Anchor cribs, upstream from position of piers, were thus formed, and sunk through the ice, to serve for holding of cofferdams, etc.

The first caisson 150 by 20 ft. for the north abutment was towed upstream from the Lachine Canal May 24, 1854. This was practically the beginning of the work on the bridge.

It was soon found impossible to moor this caisson broadside against the current. The end caissons, parallel to the current, were then first moored, after which a line of stone filled cribs was sunk just above position of the side caisson. The cribs supported timber beams carrying one end of an incline apron of timbers with upstream end on the river bottom. This gave quieter water and allowed placing of the longitudinal caisson for the abutment cofferdam.

By August 28th., 1854 the cofferdams were pumped out and masonry was begun. The stone, brought down through the Lachine Canal, was trucked from the canal basin. 85428 cub. ft. of stone was laid during the summer, bringing the abutment to about 4 ft. above summer water level. The embankment approached to about 5 ft. above water level, but connection between it and the abutment was not completed when work ceased in the fall; in consequence a large part of the embankment was washed away by the spring high water.

The caisson for Pier 1 cofferdam was in place June 14th. Two months later the masonry was above water level, but was not finished until late in November, too late by a few days for removal of the dam caisson.

For Pier 2 the caisson was in place early in July. It was struck by a large timber raft, carried downstream, anchored and brought back to position.

Other delays prevented pumping until Sept. 18th. A large leak, due to a fissure in the rock, could not be stopped, so that pumps were kept going until masonry was above water level.

On account of extreme difficulty in floating the large cofferdam caisson to place it was decided to construct the dams for Piers 5 and 6 of cribwork. To build the cribs on shore and tow them out was found to be impracticable. Then cribs were built in the lake above and floated down but could not be held in place. Finally a crib was built just below the mooring crib and sunk to place. From this other cribs were built until the dam, by this slow and costly process, was completed.

The first working season at the bridge was a period of great difficulty. There was great demand for labor in western states, repeated strikes—in one instance a party of mechanics brought from England at a cost of \$3000. All struck and left within a fortnight—and finally cholera broke out, and did not abate until September, after which work was more satisfactory. Work had to be stopped, with severe weather, the first week in December.

The cofferdam for the south abutment was constructed of cribs, work beginning about middle of May, 1855. Water along the shore was shallow and the current 2 miles an hour. Material was taken out on a tramway built on cribs. The dam was completed and pumped out by end of July, the ground excavated 8 ft. to sound, hard bottom. Masonry was begun end of August, and by close of season was $2\frac{1}{2}$ ft. above water level. Stone for the south abutment and several south piers was brought from La Motte Island in Lake Champlain. It was taken in barges 40 miles to St. John thence by Champlain railway to site. This stone had smoother fracture, otherwise differed little from that of Point Claire. A steam traveller, 60 ft. span on longitudinal tracks 1300 ft. long, handled and sorted all stone on the south shore.

The emigrant mechanics as also the men in charge greatly improved on their native capacity. Expensive travellers built in England would not work, while subcontractors from England roughly built the one used, which worked well. During the winter of 1854-55 cribwork for Pier 6 dam was built on the ice and sunk to place, low enough for spring ice to go over it. It moved downstream considerably and had to be brought back to place after the spring ice run subsided. Until the winter of 1858 no more crib work for dams was sunk through the ice.

Dam No. 5 was completed and after great difficulty from leakage masonry was begun Oct. 10th, and left 2 ft. 2 in. above summer water level by Nov. 24th.

At Pier 3 bed of river was 10 ft. higher on one side than on the other. Water was not pumped out of the cofferdam until Oct. 20th. Two nights later the engine house was burnt down and pumps etc. destroyed. The dam was then planked over and made secure until next year.

In 1856 the first operation was to sink mooring cribs from the ice for Piers 7, 8, 9, and 10. For Piers 8, 9 and 10 the cribs were in pairs, 20 ft. apart, 100 ft. upstream, arranged for dropping a timber apron hinged on a beam laid across downstream ends of the cribs by which the current could be sufficiently stopped so that cribwork for dams could be constructed in the eddy.

The cofferdam for Pier 3 was pumped out by June 2, masonry begun 9th July and completed 31st October.

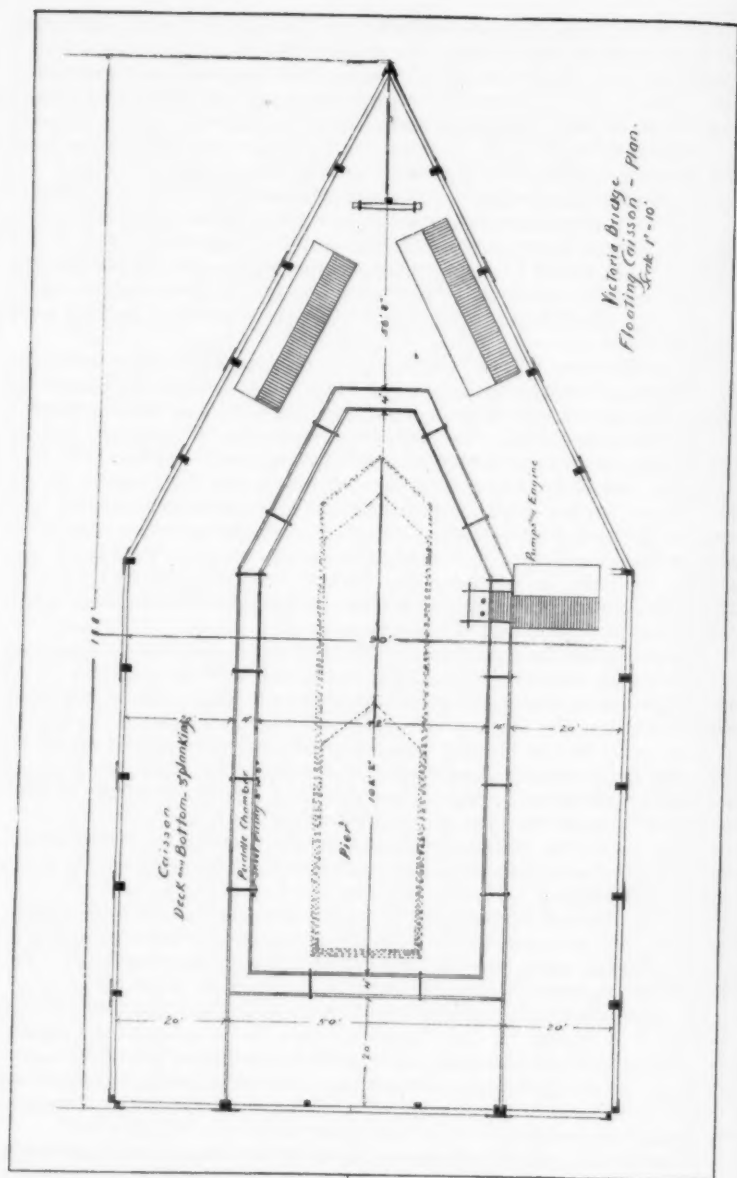


FIG. VI.

With No. 4 Pier the main difficulty was getting material to it over the shallow water filled with boulders. A temporary bridge, supported by 2 scows, leading from Pier 3, solved the difficulty.

For Piers 5 and 6 the cofferdams were also formed of cribwork.

For Pier 7 the floating cofferdam was again brought into service. On June 3 it was in place and scuttled, on Aug. 12th pumping began and by Oct. 31st masonry was completed, after which the cofferdam caisson was floated and taken 5 miles down the river to winter quarters, about end of November.

Dams for Piers 23 and 24, framed of cribwork, were put in this year with little trouble. Material was carried to these piers by a tramway resting on cribwork piers. Hoisting and setting of stone was done by a steam derrick.

For piers generally, throughout the bridge, the stone was delivered by barges. Work was simultaneous at a number of places. There was occasional difficulty in keeping the proper sized stone for the various working places supplied, thus causing delay, sometimes for days. Stone was in large blocks with outer stone of 10 to 15 tons. Six months was the maximum working season for laying stone.

In 1857 the solid ice formed the first week in January and the river broke up April 12th. There was delay in the early part of the season by reason of lack of funds, and it was end of June before work could proceed. The floating cofferdam was used for Pier 18. It was moved to the mooring crib June 18th and scuttled June 26th. By August 18th it was pumped out and excavation was begun. This had to be carried 9 ft. down to rock bottom. Masonry was completed November 26th. For Piers 19, 20, 21 and 22 dams were of cribwork and stone was taken out from the south shore by a tramway on cribs, same as before. All of these piers were completed this season.

Piers 8 and 9, cribs for which had been displaced the previous season by spring ice shoving, were proceeded with this year.

Shortness of season for setting masonry induced adoption of a method used successfully at St. Ann's bridge. Strips of asphalted felt, 3 inches wide, were used for bedding the stone courses and along outer edges, just back of pointing space. Open vertical spaces about 1 ft. square were left throughout the whole height of the masonry all this being carried on in winter. With return of regular working season pointing was done and the whole interior well grouted through the flues left. Clear water filtering through the grouting accurately showed progress of filling voids.

Erection of the superstructure, fabricated at the Canada Works, Birkenhead, England, began this year. The staging consisted of Howe trusses supported on scows, 60 x 20 ft., sunk and kept in place by spuds, same as the floating cofferdams. The lower chords of the Howe trusses carried a platform of 3 inch planking resting on cross timbers; the upper chords carried rails on which the erecting traveller moved. The platform was 3 ft. 3 in. below position of underside of the tube. The bottom plates were first laid and held with bolts, the holes were then reamed and

rivetted. Drift pins were first used for nonfitting holes, but this was finally prohibited.

The bottom plates were laid to camber adjusted by oak wedges on longitudinal timbers. Erection of sides of the tubes began at centre of span with T bars for joints, the plates not quite to touch, otherwise the side was liable to buckle. The top plating followed the sides as closely as possible.

The tubes were united in pairs, fixed on the mid piers and having expansion rollers at the other ends. In the early part of the work the first tube of a pair was erected and swung and then the second one erected and joined to the first before supporting wedges of the former were taken out. This caused undue tension at the top and partial compression at the bottom when the second tube was swung. Later practice was to free both tubes and allow them to take bearing for ten days before they were joined. They were then connected at daybreak when temperature would be uniform throughout.

Staging construction was heavy and solid to prevent any subsidence during erection. Staging for span 25, at south shore was erected this summer, two Howe trusses with crib work support at the centre; and left for erection of tube during the winter. This was duly accomplished, erection beginning January 13th, and being completed March 31st.

1858. Cribbs for five dams, 12 to 16 inclusive, were placed through the ice during the winter. A severe ice shove in the spring, before rise of the water, destroyed 14, 15 and 16 and, partly, 12 and 13. Most of the crib work had to be removed from the pier sites.

At Pier 17 the floating cofferdam was again used, with, however, a crib across the downstream end instead of the movable part. Excavation proceeded in usual manner by sinking a sump hole to or into the rock.

There was difficulty in getting stone out fast enough when work on six or seven piers was going on at the same time.

The north end piers were on bare rock to which sheet piling could be fitted. Further out, with deposit and boulders, the puddle chamber had to be wider and sheet piling heavier. Boulders and loose stone were, in general, removed by divers. At Piers 14, 15 and 16 a steam dredge was used to remove deposit, to rockbed. No. 10 dam was begun June 28th, completed 24th September and the masonry completed November 30th. No. 8 dam, abandoned in 1857 on account of leakage, was finished with much trouble and the pier completed October 21st. The embankment approach, south shore, was begun this year and carried to winter water level. At close of the season only No. 11 Pier remained to be founded, Nos. 14 and 15 to be carried up from summer water level and the abutment walls to be finished. During this season eleven spans, including No. 25, were erected. All erection of tubes was fairly simple and of same procedure as for span 1.

Camber for span 1 was set at three inches, this left slight sag after span was swung. The next span was set at six inches, a camber which left rise of two inches at the centre when swung. Finally four and one-half inches was adopted for setting camber.

The crib supporting had always to be made strong enough to resist striking by timber rafts, many of which came down the river and were more or less unmanageable. For spans over shallow water the staging was in four lengths so that strong longitudinal timbers could be used instead of two trusses, and cranes used instead of travellers for moving the material for the tubes.

Detail erection plan of each tube was made at the shop, the Canada Works, and each piece carefully marked with its erection number or mark. There were nearly 5000 pieces for each tube. Arrived in Canada the pieces were stacked in order of erection.

As soon as it was evident that piers 12 and 13, for the centre span, would be reached by end of summer, two crib work piers were begun to serve as supports for continuous Howe truss erection staging, the ends of the truss to rest on corbels left for them on the piers. There was much trouble in placing these support cribs, due to the swift current, accelerated by blocking of the channel under the other spans.

1859. The ice solidified first week in January, and following days were the coldest for many years. For raising of material for the centre span a timber incline was built from the ice to the top of Pier 12, and a tramway laid on the incline, with trucks, to which the material was transferred by crane from the sleighs. The trucks were drawn up by a chain operated from an engine placed on the ice in front of Pier 12. For fire protection force pumps and hose could also be operated by the engine. This apparatus was under care of a watchman day and night.

Placing of the tube bottom, centre span, began January 31st. By February 9th, it was so well advanced that forty groups of reamers could be put to work, closely followed by the rivetters. Work was continued at night by light from large fires in braziers. The men worked with thick gloves and heavy overcoats; they had to stop when temperature dropped to 20 below zero. Many men were taken to hospital for frost bites. On February 12th the first pair of side plates was erected. Side plates were machine rivetted at the shop in lengths of three plates, about ten feet, and so brought to the bridge on sleighs.

Camber of the larger centre span was adjusted to 6 inches. There was partial subsidence, owing to settling of staging. Finally the camber was reduced to $4\frac{1}{2}$ inches and when the span was swung there was a sag of 3 inches, but otherwise the tube was well in line.

Bottom of the tube was completed February 28th, with 180 feet of sides up. By March 11th the greater part of the iron was in place and on March 21st all iron was in place, notwithstanding a severe storm on the 15th which destroyed much of the scaffolding. On March 26th rivetting was practically completed and the span swung.

The centre tube consisted of 10309 pieces and required nearly half a million rivet holes. Fabrication at the shop in England was so accurate that all rivet holes fitted in erection, requiring only some reaming.

Much difficulty, both in building the piers and in erecting the superstructure, was caused by the numerous timber rafts coming down the river. These rafts were in general about 40 ft. by 250 ft. in size. They

were difficult to guide through the comparatively narrow openings between the staging supports, or even between the piers at full span, with the swift current. At one time during erection 35 rafts were seen from the bridge.

Work on cofferdam for Pier 11, which was begun May 3, was completely wrecked by two rafts striking it. It was again proceeded with and was slow and difficult work. By August 12, with excavation work under way, the first foundation stone for this the last pier could be laid, as was done in presence of 300 spectators. The pier was completed in six weeks, with 108,000 cubic feet of masonry.

During erection of No. 12 span one cribwork support of the staging was struck by a heavy scow, used in removal of No. 11 pier cofferdam. The crib moved downstream 2 ft. and the tube, partly completed, dropped from the supporting wedges to the timbers, but remained on these. At one time thirteen rafts, shifted by a sudden squall, struck piers and staging supports, causing a jam of loose timber which was finally cleared away. During course of erection of superstructure several spans were in danger of falling on account of rafts striking the staging supports. On the 17th of December, the day appointed for first passage of trains the last staging was carried away by ice and thus the river cleared of all obstruction except the piers.

Roofing of the tubes was of wood, covered with tin, with a two foot wide footway on the centre ridge. Rails over the webs of the tubes carried an iron traveller, projecting over the sides, for painting. The permanent track through the bridge was laid with 63 lb. U rails resting on 12x14 inch continuous timbers, with oak ties spaced 14 ft. The timbers were bolted to place at the rest piers; at all other places they were notched over the floor beams, to allow for expansion. The rails were fastened down with dogs, with rolled iron chairs of 14 lb. weight at the joints. Holes cut in the webs and spaced 60 ft. admitted light to the tubes. A 4 ft. footway extended along one side of the track.

During all the work on Victoria Bridge a medical staff of five doctors was maintained at a cost of over £1000 annually.

The spans were tubular girders, built of iron plates, in general plan similar to the Menai Straits bridge, and were continuous in pairs. The tubes were 16 ft. wide, 18 ft. 6 inch high at the ends increasing to 22 ft. height at the centre. Of the 25 spans 24 were 242 to 247 ft. in length—it was apparently easier to slightly vary the tube length than to exactly locate the piers—and the centre span 330 ft. Under clearance was 36 ft. at the abutments with grade from each end toward the centre of 1 ft. in 130, about 2 ft. to the span, giving clearance of 60 ft. under the centre span.

The 24 piers were of solid masonry, with stone 5 to 20 tons in weight held together by iron clamps. 22 piers were 90x18 ft. at water level, 33x16 ft. at top. The centre span piers were 28 ft. wide at water level 24 ft. at top. The abutments were 240x90 ft. Approach embankments were rip-rapped with 5 to 8 ft. of stone to resist ice shoving.

Maximum increase in camber of the tubes observed in one day was $1\frac{1}{4}$ in. with temperature 124° on top and 90° at bottom. Maximum

observed expansion in one tube from temperature range of 27° to 128° was $3\frac{3}{4}$ in., maximum lateral movement $1\frac{1}{4}$ inch.

The bridge was designed to carry a live load of 1 ton per running foot throughout. Dead weight per regular span was 252 tons made up as follows:

Top of tube	76 tons
Bottom tube	92 "
2 Webs	84 "
Total	252 "

or approximately 1 ton per running foot, making total of live and dead 2 tons per running foot.

Unit stresses were taken at 4 tons per square inch in compression and 5 tons in net tension.

As to tubular girders, which were extensively used for a considerable period, the general rule became established that the minimum depth should be one-fifteenth of the span length. In the Victoria Bridge the ratio was one-twelfth.

The Report by Alexander M. Ross, Chief Engineer, George E. Bruce and B. P. Stockman Assistant Engineers, states that erection of the last tube, span 14, was completed Monday December 12th, 1859. One week later the bridge was opened for traffic.

In testing, a live load of 1 ton per running foot, as near as this could be attained with a train, was imposed over the full length of two spans at a time. With load on one tube only, the deflection was $\frac{7}{8}$ in. with a slight lift of centre of adjoining span forming the continuous pair. With load covering the two spans of the pair deflection in each was $\frac{3}{4}$ inch. The ton is 2,240 lbs. throughout.

The centre span, when loaded full length, showed deflection of $1\frac{3}{8}$ inch. All tubes returned to original form with test load removed. The actual deflection was well within what had been computed. The tubes had excess strength over designed loads and stresses. The centre span test gave only $\frac{5}{8}$ of the computed deflection.

It was found difficult to make up a train of what was considered the enormous load of 1 ton per running foot; a load which would surely never be attained by ordinary traffic!

The engineers recommended acceptance of the bridge, and expressed regret that Mr. Robert Stephenson, according to whose wishes everything had been carried out, did not live to see completion of the structure.

REBUILDING THE VICTORIA BRIDGE.

In 1897-98 the single track tubular bridge was replaced by a double track, pin connected, truss bridge superstructure, 24 spans of 254 ft. uniform length having parallel chords and 40 ft. depth between centres of top and bottom chord pins, with 31'2" width centre to centre of trusses throughout the bridge. The larger centre span is of correspondingly greater height. 17 ft. roadways are carried on brackets on either side of the trusses.

The old piers were lengthened, but only above the water table of the cutwaters, for the greater width of the new spans. Below the water table the piers remain unchanged, the foundations being ample for the new loads.

The new railway live load capacity is two 294,000 lb. consolidated engines followed by a trainload of 4,000 lbs., for each track.

The masonry work was done by Wm. Gibson of Beamsville, Ontario, and the superstructure by the Detroit Bridge & Iron Works, 10 spans; the Dominion Bridge Co. 6 spans; and the Union Bridge Co. of New York, 9 spans. The whole work was carried out under direction of Joseph Hobson, Chief Engineer G.T.R. as Chief Engineer. Trains began to run on the double track of the renewed bridge December 13th, 1898.

THE INTERNATIONAL BRIDGE.

This bridge crosses the Niagara River a short distance below Lake Erie, from Black Rock, Buffalo, to Bridgeburg, Ontario, with an island intervening.

The project for the International Bridge had its origin in 1857 when charters for it were granted by the Parliament of Canada and by the Legislature of the State of New York. Lack of funds kept these charters dormant for thirteen years.

The Buffalo and Lake Huron Railway was the first Canadian Railway interested in the project.

Capital was at length subscribed in England in 1870, £272,500, and the Grand Trunk Railway Company was authorized to guarantee annual interest to the extent of £20,000, upon which the "International Bridge Company" with a nominal capital of \$1,500,000 was formed.

The contract for building the bridge was let to C. S. Gzowski and D. L. McPherson of Toronto for \$1,000,000.

Stone piers and iron superstructure were required, with two swing-bridges, one over the river channel and one over the Erie Canal at Black Rock, both being pivoted on centre piers, with main channel span 362 ft. total length, having two openings of 160 ft. each, and the canal span two openings of 90 ft. each.

Chief Engineer of the bridge was E. P. Hannaford, Chief Engineer of the Grand Trunk Railway, and Resident Engineer Joseph Hobson, Chief Engineer of the Great Western Railway.

The bridge site entailed great difficulties of construction, such as depth of water of nearly 50 ft. maximum with frequent and sudden fluctuations due to winds piling up or holding back the water of the lake, treacherous bottom, a current varying from $5\frac{1}{2}$ to nearly 12 miles an hour, exposure to large timber rafts throughout the season of navigation, and impossibility of working in the stream during winter season on account of floating ice.

Length: Abutment Canada side to abutment Squaw Island	1,967.5 ft.
Across Squaw Island	1,167 "
Squaw Island to E. Shore	517 "
Total shore to shore	3,651.5 "

From the west abutment there are 6 piers to east end of the channel swingbridge. The first three spans are 197 ft. each, the next three 248 ft. each. The pivot pier is No. 7 and east end of draw No. 8. Span, draw to Squaw Island, 197 ft.

Normal depth of water: at Pier	1,	10	ft.
"	2,	20	"
"	3,	33	"
"	4,	47	"
"	5,	48	"
"	6,	30	"
"	7,	16	"
"	8,	9	"

The superstructure was built by the Phoenix Bridge Company, the general design Whipple, double intersection, trusses with Phoenix columns and connections. Canadian Railways using the bridge were the Grand Trunk Railway, the Great Western Railway with special connection from Glencoe, and the Canada Southern Railway.

The total cost including extra cost due to difficulty of foundations, connections, $3\frac{1}{2}$ miles, with New York Central, and with Canadian Railways, also interest during construction, was a little under \$1,500,000.

Characteristics of river. A northeast wind will lower the water 2 ft. in half a day; while a southwest gale up the lake will raise the water 4 to 5 ft. in as many hours and increase the current to 12 miles an hour. The riverbed is rock along the west shore, approaching Squaw Island it is partly clay with overlying gravel.

The river never freezes across. There are heavy ice runs at the beginning of winter until ice sets in the lake, and again on breakup in spring. Occasionally during winter large fields break loose. Ice on the lake forms up to 3 ft. in thickness.

Altogether the difficulties of the site: great and fluctuating depth of water, velocity of current and its rapid change, ice floes and ice runs, timber rafts, etc., and lack of appliances and methods developed later, constituted the building of this bridge, especially as to its foundations, one of the most difficult undertakings in the history of bridge building.

Construction began early in 1870, from the west or Canada shore. Pier 1 is next to the Canada shore. Piers 1, 2 and 3 were built during the first season, pier 3 being finished December 23.

For Piers 1, 2, 3, 4 and 5 water-tight caissons of heavy timber, 12x12 inches and heavier, were built ashore and floated to place. The bottoms were of six solid layers, longitudinal and transverse. These caissons were first loaded with concrete to depth of practicable draft then towed to a short distance above location, anchored, the river bottom cleared of boulders by divers if required, then the caissons let downstream to position, this being given by guide marks and instruments from shore, and sunk to place.

The west abutment was begun in January 1871 and finished in April.

With Pier 4 caisson, in the deeper water and swifter current, the first greater difficulty was encountered. The caisson broke loose, one of its anchor cables parting just as it touched bottom, and grounded

about 60 ft. below the bridge line. This was in May 1871. A new method, carried out the two following years, was adopted for piers 4, 5 and 6. This was to build a massive bottomless enclosing caisson, sink it to place and then within it sink the caisson for the pier. Very powerful tugs, and heavy anchors and cables were required to move and hold these unwieldy outer caissons. Located on river bottom with much difficulty they had then to be dredged out and material removed from under their cutting edges to sink them to rock bottom, after which the pier caissons were floated in.

Pier 5 caisson met with worse disaster than caisson 4, also in 1871, being struck broadside by a timber raft, over 300 ft. long by 80 ft. wide, which had become unmanageable. Crashing timber and caisson dragging its anchors were all carried downstream about 200 ft. to the lower end of Squaw Island.

The caissons in general were rectangular at the stern and pointed at the bow with length, varying slightly for the different piers, of about 48 ft. stern to shoulder and 55 ft. over all, and width about 17 ft. Sides and ends were vertical. The upper part was bolted to the lower which in final position was below water level, the upper part being later detached. Barges at the sides, larger than the caissons and held together by chains beyond the ends of the caisson, steadied the latter, otherwise unstable and topheavy, and allowed sinking of the caisson clear of the barges.

Most of the foundation work in Black Rock Harbor, spans 9 and 10, was done in 1871. Here, with the great depth of clay bottom, as likewise for piers 6, 7 and 8, piling was used. Piles were spaced 3 ft. centres and cut off at ground surface. The watertight caisson was then brought to rest on the piles. Abutments 3 and 4 and pier 10 the pivot pier for the harbor draw span were completed in 1871. Pier 9 was begun in Nov. 1871 and finished in March 1872.

In 1872 abutment 2 and piers 7, 6 and 5 were built.

Caisson for pier 4 was finally placed in July 1873 and the pier finished in October.

Pier 6. Enclosing caisson not carried to bed rock as it encountered hard clay which could not be dredged out. Therefore piles driven throughout within the caisson, and cut off close to bottom. Then stone rammed in to pile tops, and on this watertight caisson placed.

The icebreakers, the upstream toes of the piers, were covered with half inch boiler iron, and had slope of 6 inches horizontal to 12 inches vertical, steep as compared with the Victoria Bridge piers, to prevent ice from passing upward too high. Sides and ends of all piers, except upstream, had batter of 1 in 24, with rack face except for ice breakers and surface of copings, which were bush hammered. The pivot piers are octagonal and not of solid stone throughout, but filled with concrete in the quarters.

The stone for the underwater part of the masonry, a hard, compact, very heavy blue limestone, was from the village of Bertie about 7 miles from the bridge. Most of the stone above water came from Georgetown and Acton, on main line of the Grand Trunk Railway, west of Toronto



FIG. IX. VICTORIA BRIDGE—ERECTION OF CENTRE SPAN.

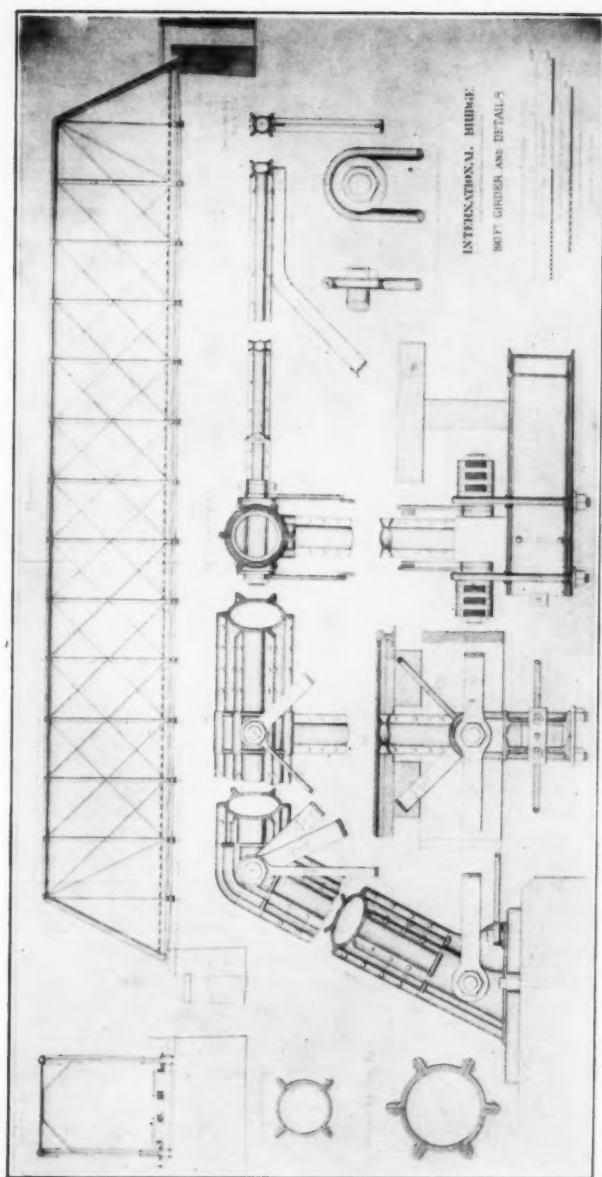


FIG. X. DETAILS OF PHOENIX COLUMNS, INTERNATIONAL BRIDGE.

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and some from Berea, Ohio. It is a close grained solid free stone, light in color. The courses are 12 to 24 inches thick.

Clamps and dowels were used in the ice breakers of all piers, as also at the quoins at the downstream ends of the piers.

The concrete was mixed, all by hand, in the proportion of 1 cu. yd. broken stone, passing through 2½ in. ring, 1¾ bbls. of cement and the same quantity of sand. All masonry work was done from scows.

Superstructure and erection. The spans were double intersection Whipple trusses with Phoenix columns and cast joint blocks and pedestals. Intermediate posts were of four rolled segments, end posts and top chords of six segments. In the majority of previous bridges cast iron had been used for top chords. Tension members were eyebars and the trusses pin connected throughout. Transverse bracing, top and bottom, was of round, adjustable rods, connected by means of stirrups and yokes. For stringers there were two 8 in. by 18 in. timbers under each rail, with outer stringers 5 in. by 18 in. Ties were 6 in. by 12 in. spaced 1 ft. clear, guard rails 6 in. by 6 in. oak, 8 in. outside of each rail. Floor beams were two 15 in. I beams suspended from bottom chord pins by yoke hangers next to posts.

Height of trusses was 26 ft. throughout except for the main draw span which was 36 ft. at centre. Trusses were spaced 20 ft. centres.

Spans 1, 7, 8, 9, and 10 were erected on fixed falsework. Spans 2, 3, 4, 5, and 6 were erected on floating staging resting on pontoons. There were five pontoons for the 197 ft. spans, and six for the 258 ft. spans. The pontoons were 17 ft. wide x 55 ft. long, pointed at the bow. Each pontoon had one long cable and these were gathered together 500 ft. upstream to one camel pontoon which was held by three heavy anchors, one directly 500 ft. further upstream and two spreading. To move this great mass of pontoons loaded with the erection falsework against the swift current required a number of powerful tugs. The pontoons were of course transversely held in place by the stiff and continuous falsework resting on them and extending to the piers.

The staging was in two heights or stories, the lower to directly under floor beam positions, the upper resting on but not attached to the lower, to near top chord levels. On top was a low traveller for the placing of truss members. The lower staging was floated entire, from span to span, the upper was taken down and re-erected. The top staging was light and was carried by the truss when lower part was out.

Spans 1, 2 and 3 were erected in 1871, being finished in October; early in 1872 the Black Rock Harbor spans were erected, the draw span and span 10. The river draw span was also erected this year and swung in January 1873. The remaining spans were erected in 1873.

The bridge was designed to carry an engine load of 2,000 lbs. per running foot of track with following train load of 1,300 lbs. per running foot. Wrought iron specifications were: Ultimate strength 55,000 to 60,000 lbs. sq. in., elastic limit 25,000 to 30,000, reduction of area at fracture 25%, elongation 15%. Unit stresses: Compression in top chords and end posts 8800, interior posts 5000; tension, bottom chords, 10,000, web members 7500; shear in pins 8000.

The first locomotive crossed the Black Rock Harbor spans July 24th, 1873, and October 27th, 1873, the first locomotive passed the full length of the bridge.

The bridge was formally opened for traffic November 3rd, 1873, by Richard Potter, President Grand Trunk Railway Company and C. J. Brydges, President International Bridge Co.

REBUILDING.

With greatly increased weight of live load it became necessary to replace the superstructure of the International bridge. This was done in 1901 by the Detroit Bridge and Iron Works, with single track steel trusses throughout, of nearly double the capacity of the former ones. The cost of this replacement was approximately \$300,000.

Later the United States Government required an increased width of channel in Black Rock Harbor, the Erie Canal entrance. This necessitated reconstruction of the canal part of the bridge. A new double track swing span, 432 ft. in length on a new pivot pier and new abutments was erected in 1910-11, replacing this part of the bridge, which had been renewed in 1901. The new live load was two engines, each of 390,500 lbs. including tender, followed by 5500 lbs. per foot of track (Cooper E.55). The cost of this 1910-11 rebuilding was \$405,000.

During the year 1915, the New York State legislature required provision on the bridge for the passage of vehicles and pedestrians from the mainland to Squaw Island. The outcome after some contention was that in 1921 a highway floor was constructed on one side of the draw span and a passageway for pedestrians on the other side. This addition, including the approaches, cost \$34,088.

ST. CLAIR TUNNEL.

The St. Clair Tunnel Company was incorporated in Canada in 1884 by officers of the Grand Trunk Railway with Joseph Hickson, General Manager of the Grand Trunk, as President. Joseph Hobson, Chief Engineer of the Great Western division of the Grand Trunk, was appointed Chief Engineer. Two years before an examination of the site had been made by Walter Shanly, for the Grand Trunk. He reported a crossing three miles below the G. T. R. ferry at Pt. Edward, as the most favorable location for the tunnel. On further investigation Mr. Hobson adopted this as the location. In 1885 borings were made, 50 ft. downstream from the adopted location line, to determine the nature of the material, and results were not considered favorable. The material to be penetrated was found very similar to that which had caused abandonment of the project to build a tunnel at Detroit in the early seventies. The river bed is fine sand and gravel, under which is a soft but tenacious stratum of clay to a shaly bed rock. It was decided to first carry out small drift tunnels from each side to ascertain practicability of the full sized tunnel. A small shaft was sunk on each bank. On the Michigan side the drift tunnel advanced only about 20 ft. while on the Canadian side it was

pushed out 186 ft., both drifts being carried forward without the aid of compressed air. Difficult material and gas were encountered and it was decided to go no further. In 1888 borings were made to the clay stratum directly on the line of the tunnel. The clay stratum had previously been found to vary in thickness to a minimum of 38 ft.

The plan finally adopted was to bore the tunnel through this clay stratum about midway between the underlying rock and the river bottom; and to do it by means of a tunnel shield working in compressed air, to hold up the soft clay.

Length of the tunnel proper is 6,026 ft., total length with approaches 11,553 ft., from surface to surface. Diameter of bore is 21 ft., interior diameter 20 ft. Grade of approaches is 2%; under main part of river the tunnel is almost level, having a grade of one-tenth of one percent toward the Canadian side, for drainage. The tunnel shell consists of cast iron flanged segments 2 inches thick. The lower half is lined with brick and cement to a total thickness of 6 in. Longitudinal timbers and ties carry the track which is of 100 lb. rail.

The shields, penetrating from the portals on each side of the river, were 15'3" long with outer diameter of tunnel bore. They were designed by Chief Engineer Hobson on general lines used before, but with many new and special features. They were propelled by 24 hydraulic rams of 18 in. stroke.

As contractors were afraid of the risk and no satisfactory tenders could be had the work was carried out directly by the company, by day labor.

There was delay, due to earth slides in the approach excavations and to other causes so that the tunnel work proper did not get well under way until about midsummer of 1890, after which progress was rapid, the shields moving as much as 9 ft. a day each. The tunnel was opened for traffic in September 1891.

The cost was \$1,460,000 which was materially below preliminary estimates.

For some years the tunnel was operated by ordinary steam locomotives. Difficulty of proper ventilation, vitiated air by reason of sulphur fumes from the coal and danger of trains stalling in it induced change to electric traction.

THE COTEAU BRIDGE.

The Canada Atlantic Railway at first used a ferry for transfer of its traffic across the St. Lawrence River between Valleyfield on the south shore and Coteau Landing, opposite. This ferry became inadequate for the company's constantly increasing business. In the fall of 1888 the contract for the substructure of a bridge at this point was let to Messrs. Neelon, McMahon & Shea of St. Catharines, Ontario. During the following winter quarries were opened, stone cut, barges built and the necessary plant put in readiness. Ground was broken for the north shore abutment on April 1st, 1889 and all the foundations were completed by December 6th of the same year.

The contract for the superstructure was let to the Dominion Bridge Co. early in 1889. Erection began September first of that year and the last span was floated to position on the 19th of February 1890; the bridge was put in service for traffic the following morning. The entire time of construction from the beginning of the foundation to the time of turning the bridge over for service was ten months and twenty days.

Increasing live loads, as in other railway bridges, necessitated the renewal of the superstructure of the Coteau Bridge and this was done in 1911, the new bridge being designed for Cooper E. 50 loading. At the same time the substructure was reinforced throughout.

Illustrations.

Fig. I. First train with engine, Champlain & St. Lawrence Ry. 1837. From a print in the Chateau de Ramezay, Montreal.

Figs. II and III. Early wood burning engines, Northern Ry. and Grand Trunk Railway.

Fig. IV. Photograph showing double gauge, Great Western Ry. Windsor, 1865.

Fig. V. Map, Grand Trunk Railway System, 1902.

Fig. VI. Drawing, Floating Cofferdam, Victoria Bridge, Pl. 1.

Fig. VII. Drawing, Details of puddle chamber, Victoria Bridge, Fig. 1, Pl. II.

Fig. VIII. Drawing, U Rail. Victoria Bridge, Fig. 2, Pl. II.

Fig. IX. Erection of centre span. Victoria Bridge.

Fig. X. Details of Phoenix Columns, Etc. International Bridge.

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EDITOR'S NOTE: It was the original intention that one of our members should contribute an article on the history and development of the Grand Trunk Motive power. Unforeseen difficulties and delays have prevented to make this article appear in this bulletin. Our members however, will have it to look forward to in one of the bulletins that will be issued next year and it is to be hoped that the material substituted will be of equal interest.

